THE DISEASES

OF THE

UTERINE CERVIX

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PREFACE.

The propriety of discussing the diseases of the uterine cervix separately from those of the corpus, rests fundamentally upon the anatomical division of the uterus into two parts, a superior segment, and an inferior segment, sharply marked at the internal os.

This division, which concerns all the structures of the organ, is apparent in the embryo. It continues with increasing distinctness through development and growth, both intra-uterine, and extra-uterine, and is carried into the final up-folding of the uterus that characterizes the close of reproductive activity.

Corresponding to this structural division, there is a specializing of the functions performed by the two segments of the uterus ; and in as much as all disease is based upon health, and finds its cellular prototype in normal histology, and accomplishes its metabolism according to physiological laws, the pathological processes that have their initial development in the uterine cervix, are quite distinct in their etiology, construction, and clinical course, from those that originate in the uterine corpus. Diseases of the inferior segment may invade the superior segment of the uterus, and those having their origin in the superior segment may spread downward, but their pathogenesis can always be made out, and their clinical histories differentiated.

The advantages that accrue from a separate consideration of the diseases of the uterine cervix, are those that belong to special investigations in general. Particular lines of study pursued independently of each other, lead to an accurate and exact knowledge of a subject when these lines are made to converge, and their relations and inter-dependence adjusted, and balanced.

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Diseases of the Uterine Cervix.

CHAPTER I.

DEVELOPMENT OF THE UTERUS AND VAGINA.

The development of the uterus and vagina in the human fœtus forms a part of the history of the **Wolffian Body,** or **Mesonephros,** a mesoblastic embryonal organ developed in the intermediate cell mass, that lies in the lumbar region on either side of the mesentary. This body attains its maturity early in the second month of fœtal life; by the third month its primary function, that of a kidney, becomes vestigial, its permanent parts being then connected with the genital system.

The Wolffian Body, after it has ceased to perform its function of primordial kidney, and given rise, from the Wolffian duct, to the permanent kidney, evolves three organs.

The Genital Ridge, lying on the mesial side of the Wolffian Body, a differentiated body covered with germinal epithelium derived from the mesoblastic lining of the cœlum, or peritoneal cavity, from which the genital glands, ovaries, or testicles are developed.

The Wolffian duct, the first longitudinal duct to appear in the uro-genital system, is recognized at the end of the third month of embryonal life as a tube, formed by an invagination of the epiblastic layer into the intermediate cell mass, into which the **Wolffian tubules** enter. The Wolffian duct is the essential embryonic male genital duct, as it gives rise to the organs and parts concerned in conveying the fertilizing elements from the male sexual glands to the female genital organs. The Wolffian duct has no well-defined function to perform in the female; its relation to the adult female genital system is accessory,

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and when more than this, it becomes pathological.   The only portion of the Wolffian duct that persists in the adult female, is a tube that occupies the **meso-salpinx** between the ovary and the Fallopian tube.   This portion, together with its genital tubules, which in the male form the vaso-efferentia and coni-vasculosa, becomes the **parovarium** and **paroophoron,** functionless structures, vestigial organs, and as such peculiarly susceptible to the development of pathological processes.   The continuation of the meso-salpingial portion of the tube passes down through the uterine cervix and vagina, to terminate in a bulbous mass of epithelium, which quite occupies the lower end of the fused Mullerian ducts.   These buds are subsequently hollowed out, save that portion which forms the hymen, and thus give the epithelial lining to the vagina.   All traces of the inferior portion of the Wolffian duct is then lost, excepting its epiblastic structure, the lining of the vagina. When the parts that pass through the cervix persist, they are known as **Gartner's ducts,** and are to be regarded as embryonal organs in mature structures.

The Mullerian duct is the last of the three embryonal organs of the uro-genital system to appear.   It is the essential embryonic female genital organ.   From it are developed the uterus, the Fallopian tubes, and vagina.   In the female it is a true oviduct, but in the male it persists as the *sinus pocularis* in the prostate gland, and pathologically, the end of the duct remains as a sessile hydatid on the testicle.

Towards the close of the fourth week of embryonic life there appears on each side of the outer surface of the Wolffian body, inferior to the Wolffian duct, a slight thickening of the intermediate cell mass, into which, by a process of invagination of the mesothelium, a tube is gradually formed—the **Mullerian duct.** These ducts, two in number, are continued downwards on the outer side of the Wolffian ducts into the pelvis, where during the third month of foetal life they are fused together to form the **uterus and vagina.**   The head of the duct, or beginning of the lumbar portion, remains open into the coelum, from which its mesothelial lining is derived, and becomes the fimbriated opening of the **Fallopian tube.**   The pelvic portion of the

Mullerian ducts, from which is developed by fusion the uterus and vagina, constitute, together with the Wolffian ducts, **the genital cord.** In this situation the relation of the four ducts becomes altered. The Mullerian duct, as it bends quite abruptly towards the median line to join the duct of the opposite side, has attached to it a fold of the Wolffian body, the inguinal fold, which becomes, by the addition of muscular elements, the **round ligament.** At this point the uterine cornua is developed, and below it, the Mullerian ducts increase in size, pass in front, and to the inner side of the Wolffian ducts, and fuse in the median line.

From the parallel tubes thus fused are developed **the uterus and vagina.** by a gradual disappearance of the septum of union, and differentiation of cell masses, which mark off the vagina from the cervix, and the cervix from the corpus uteri.

It is thus seen, and this point may be emphasized because of its bearing upon the pathology of the uterine cervix and portio-vaginalis, that the **corpus uteri** is developed almost wholly from the Mullerian ducts, *mesoblastic structures*, and that the **cervix uteri** has, in embryonic life, a slight incorporation with the Wolffian duct, an *epiblastic structure*, that should entirely disappear from the cervix before the fourth month, and that **the vagina** is a compound organ, depending for its structural parts upon the Mullerian duct—*mesoblastic*—and for its lining upon the Wolffian duct—*epiblastic*.

Changes in embryology are rapidly accomplished. When fusion between the Mullerian ducts takes place—the third month—there remains **a septum** in the mesial line which extends the whole length of the union, a condition that persists in some vertebrates as a double uterus and vagina.

The first portion of the septum to disappear, the process by which this is accomplished is one of resorption, is that which corresponds to the cervical canal. This begins almost immediately after fusion takes place, and is completed by the middle of the third month. The next portion to disappear is the vaginal septum, this is completed by the end of the third month. The third and last portion of the septum to disappear, is that of the fundus; this is completed before the fifth

month.   Until this time the nascent uterus is double horned,
the exact line of demarcation between the Fallopian tube and
the uterus, the cornua, not being well marked, but by the con-
solidation of the corpus with the cornua the organ gradually
acquires the shape it bears at birth.

In the early part of the fifth month, the entire septum of
fusion of the Mullerian ducts having disappeared, the vagina
is marked off from the uterus by a circular outgrowth of cells,
which forms **the external os,** and by a change in the epithelium,
which becomes stratified, while the epithelium of the upper
half of the cervical canal, and the corpus, remains columnar.
About the middle of the fifth month a nodule develops from
the anterior segment of the differentiated os, the beginning of
the **anterior lip of the os uteri.** A little later a similar pro-
cess repeated posteriorly, results in the development of **the
posterior lip.** By the sixth month, the anterior and posterior
lips are fused laterally.   But the line of union is neither al-
ways perfect, nor secure, for cases of bilateral laceration have
been observed at birth.

During this period there is a rapid growth of muscular tissue
in the lower segment of the uterus, which thus becomes mark-
edly thickened, and by the seventh month, **the internal os** is
formed, and the cervical canal differentiated from the superior
segment, or body of the uterus.

Thus far the embryological developments have been princi-
pally architectural, that is, building according to a plan of con-
struction.   The last two months of fœtal life are occupied largely
in perfecting the structure already built, in preparing it for
functional activity.

The Mullerian duct possesses no muscular tissue, and while
muscle cells begin to appear by a separation of the mesoblastic
embryonal cells as early as the fifth month, **the development
of muscular tissue** in both the vagina and uterus proceeds more
rapidly on the lines of growth than of development, during the
eighth and ninth months of intra-uterine life.   The inner layer
of cells, which results from the separation of the mesoblastic
cells, becomes the **decidual tissue** of the uterus, which gradually
assumes its structure of functional perfection.

The genital canal, uterus and vagina, is at first lined with simple stratified columnar epithelium.   Changes in this are not especially marked until these organs have begun to assume their splanchnological type.   The first change noticed is in the fourth month, when in the lower third of the cervical canal, the columnar epithelium begins gradually to pass into stratified pavement epithelium, and this into the cylindrical epithelium of the upper part of the canal.

At the ninth month, the epithelial cells of the cervix elongate and change into mucous secreting cells, which arrange themselves into **mucous racemose glands.**   By the end of the ninth month, the entire epithelial lining of the cervical canal has undergone this change, and the inferior segment of the uterus may be regarded as a glandular organ, as far as its function is concerned.

This part of the uterus does not seem to possess any function that would connect it with either menstruation or pregnancy, and inasmuch as it is the entrance to the fœtus-containing organ, and the abdominal cavity, and its glands secrete a peculiar substance that acts as a barrier to the entrance from without of all but mechanical measures, may we not regard the uterine cervix as the guardian of the lower segment of the uterus, and as such the key to the pathology of the uterus.

CHAPTER II.

ANOMALIES OF DEVELOPMENT, AND CONGENITAL DEFECTS.

Developmental irregularities of the lower segment of the uterus are associated with more or less pronounced expressions of the same erratic force in other parts of the uro-genital system, and therefore any discussion of malformations of the cervix uteri must include reference to the embryological periods through which the entire system passes to perfect development.

Malformations of the lower segment of the uterus, as well as of the whole organ, and of the Fallopian tubes, have their origin in developmental irregularities that date from the beginning of the second month of embryonic life. At this period ingrowths of the mesothelial lining of the cœlum take place in to the **Wolffian ridge.** From these ingrowths the **Mullerian ducts** are developed, and malformations of the oviduct may occur at any stage of development until coalescence of the Mullerian ducts on the median line, which forms a single tube—the uterus and vagina—is accomplished.

Each malformation is a permanent expression of a stage of development through which the perfect organs are evolved from the oviducts, and therefore anomalies of development are arrests of the developmental process, and have to do, *first*, with the formation of the Mullerian ducts; *second*, with their fusion; and *third*, with the incomplete removal of the septum of union.

The ingrowth of mesothelium from which is formed Muller's duct, is at first a solid cell mass. Towards the end of the second month, or the beginning of the third, this cord acquires a lumen, and from that time becomes tubular, assuming the anatomical formation of an oviduct.

Failing to become tubular, but in other respects pursuing a normal course of pelvic descent, the Mullerian duct, as a solid

body, occupies a position in the median line, between the folds of the **meso-salpinx, the broad ligament.** Thus is formed, from developmental irregularities, the **uterus rudimentarius,** the first arrest in the development of that part of the uro-genital system from which the uterus and vagina are formed.

The rudimentary uterus appears as a solid muscle, or fibro-muscular body, occupying the position of the normally developed uterus, between the folds of the broad ligament. Sometimes there is a slight dimple to indicate the position of the external os ; at other times there is no such depression. It is the development of a single Mullerian duct, the second duct commonly being absent, or lying as a detached body anterior to the rudimentary organ. One ovary is usually present, and though amenorrhœa must be a clinical feature of such malformations, the menstrual molimen may occur, or vicarious menstruation take the place of the normal flow.

The vagina is generally rudimentary, or may be absent, represented only by a cul-de-sac. It is rather difficult to explain how that portion of the Mullerian duct from which the vagina is formed could become tubular, while the upper segments remain solid throughout their greater, or their whole extent. The most acceptable accounting for the rudimentary uterus and vagina, is, that the vagina is only such in appearance, and is in reality an irregular and exaggerated persistence of the uro-genital sinus, which should terminate at the hymen, but is in this anomaly deepened, to meet the lower segment of the rudimentary uterus.

The rudimentary uterus is chiefly of clinical interest. The subject is sterile, and upon this issue medico-legal questions of great moment may arise. Sexual feeling may be normal, and coitus may take place, though the shallow introitus may render the act extremely painful. Instances are on record in which the urethra has fulfilled the office of a vagina.

The treatment of rudimentary uterus, must in the majority of cases be limited to protecting the patient from physical injury, and if the malformation is known in adolescence, advising against any steps that look towards assuming the marriage relations. It is within possibility that active

ovaries may give rise to such local and general disturbance, there being no menstrual flow, as to support the advisability of oöphorectomy to bring on an artificial menopause ; and if it could be established by examination that only the lower segment of the uterus is solid, that the corpus contains a cavity, it might be advisable to endeavor to establish a communication between the vagina and the uterine cavity, upon the same principle that we seek to reconstruct an imperforate rectum. Or, what I look upon as a more surgical procedure, any treatment being called for, amputation of the solid cervix, up to the internal os.   Thus would be avoided the almost certainty of contraction and consequent failure.   It is not, however, likely that the surgeon will be called upon to apply his skill to the remedy of this malformation, for in the absence of positive proof, exceedingly difficult to obtain, that the procedure would be followed by reproductive possibilities, no operative treatment should be undertaken.

Absence of the uterus, uterus deficiens, or any of its segments, is among the rarest recorded anomalies.   A positive diagnosis must be reserved for the laparotomist, for it is impossible to feel certain that some portion of Muller's duct does not remain in the pelvis that would represent a uterine body, without the aid of an abdominal examination.   Hence, uterus deficiens, while previously suspected, has only been positively diagnosed after opening the abdomen with some other object in view.

Inasmuch as the uterus is not developed from the same embryonic process that gives rise to the ovaries—**germinal cells**—it does not of necessity follow that the ovaries are absent when there is no uterus.   Indeed, as in the case of rudimentary uterus, painful amenorrhœa may lead to an examination which arouses the suspicion that no uterus exists.   In such a case pain will be caused by ovulation, and oöphorectomy offers the only means of relief.

In the third month of embryonic life, the process of fusion of the lower portions of the two Mullerian ducts begins. If the two ducts remain separate throughout their entire length, there remain two distinct uteri, **uterus didelphys,** each provided

with its own cervical canal, imperfect corpus, single Fallopian tube and ovary. The vagina also is usually double. In this anomaly no fusion has taken place, the oviducts lying parallel with each other, slightly connected by cellular tissue. Occasionally one cervical canal is closed, the lower end of that duct remaining solid. This, if the ovary of the corresponding side is active, and the uterus capable of forming a decidual membrane, will lead to **hæmatometra at puberty,** while the other uterus performs its menstrual function normally. Operative procedures undertaken for the relief of pain, discover the true nature and extent of the malformation.

The diagnosis of uterus didelphys is not difficult, whatever may be the uncertainty as to the extent to which fusion has failed between the other segments of Muller's duct. Each vagina is surmounted by a cervix, into which, if there is a cervical canal, the uterine sound can be passed. Save by a lateral deviation of the sound within the uterine corpus, the uterus Bicornis, in which coalescence of the Mullerian ducts has taken place in the region of the cervix, but not in the upper portion, or that which corresponds to the uterine corpus, cannot be recognized without the assistance of an intra-abdominal examination.

The clinical features are the same as those of the double uterus, nor are the clinical phenomena attending the two conditions to be distinguished from each other. The Uterus Didelphys, and Uterus Bicornis, are different degrees of expression of the same developmental irregularity, but in both the lower portion of the Mullerian ducts present identical anomalies.

Treatment.—Inasmuch as pregnancy may take place in either one of the uteri, our concern is limited to the possible risks attending the process of gestation, and the necessary development of the imperfect uterus, which the increasing size of the fœtus requires. Under this, and similar conditions of danger from full term gestation, the practice of repeatedly producing abortions for the purpose of saving life cannot be too strongly condemned. Our duty is to save life, not to destroy it, and while occasions may arise, in which through ignor-

ance of the conditions a woman's life is placed in extreme jeopardy by the development of a fœtus within the uterus, it may seem justifiable to arrest gestation, and empty the uterus, such practice should not be repeated. The persons who are knowingly responsible for the conception must bear its consequences, and should not look to the medical profession to assist them to avert the certain results of their conscious action.

Dysmenorrhœa from the inability of the uterus to perform its part of menstruation may necessitate oöphorectomy. Under such circumstances the operation is justifiable. The patient is practically sterile, and consigned to years of suffering unless the menopause is artificially induced.

Before the middle of the third month, fusion of the two Mullerian ducts has taken place. The removal of the septum then begins, and the arrest of this process in any of its segments results in a permanent division of the corresponding portion of the uterine canal. The first part of the mesial wall to disappear is in the region of the cervix, where the uterus and the vagina are differentiated. This is usually accomplished about the ninth week, and if arrested, results in a membranous division of the cervical canal—**uterus biforis supra simplix**—which extends from the internal to the external os. The vaginal portion, the next to disappear—about the twelfth week—may share in the same developmental irregularity, the septum continuing down to the region of the hymen, the opening in which may also be double, formed as it is from the hollowed out termination of Muller's duct.

Uterus subseptus presents no difficulties in diagnosis, and is usually discovered quite by accident, during an examination made for some other condition. The vagina being normal, the os gives no indication of malformation, and the cervical canal is not known to be divided until the introduction of the sound makes this manifest.

Clinically the persistence of the cervical septum has no other importance than its interference with parturition. It does not prevent impregnation, but may, according to its substance, obstruct the passage of the child from the uterus. Re-

moval of the septum is the only treatment called for. This
should be done as soon as discovered. Dilation of both cervi-
cal canals is essential as a preliminary step in the technique.
The septum can then be divided with blunt pointed scissors,
and the canal packed with gauze. If the vaginal septum is
intact, it will be divided before the cervical operation.

In this event I prefer to make two operations, several days
apart, or not to operate upon the cervix until the vagina is
healed. This is a matter of convenience in dressing, for I do
not like to leave any uterine dressing in place for a longer
period than forty-eight hours, while I frequently do not
disturb a vaginal dressing for four or five days. If I anticipate
contraction of the vagina, I find a rubber condom introduced
into the vagina, and packed to the required degree with gauze,
a most useful dressing. The vagina remains distended, and
the rubber, over which before introduction a handkerchief of
iodoform gauze is placed, is sufficiently elastic to prevent
undue pressure. I have applied the same principle in dress-
ing the cervical canal, using a rubber finger tip for the purpose.
But of this I will speak more fully when discussing dilation of
the cervical canal.

Uterus fœtalis, or preservation of the intra-uterine type of
the uterus, is probably of frequent occurrence. By the
seventh month of embryonic life the mesial septum has en-
tirely disappeared, and further development proceeds on the
lines of proportional growth. At this period the lower seg-
ment forms two-thirds of the length of the uterus, its walls
are thick, and lined with columnar non-ciliated epithelium,
and contain a large number of racemose glands, while the
upper segment is lined with columnar ciliated epithelium and
contains no glands, these being developed at birth. The entire
supra-vaginal portion of the cervix is elongated, but the infra-
vaginal remains undeveloped and suited to a dwarfed uterus.
The ovaries are usually present and functionally capable, but
the uterus is not sufficiently developed to respond, either to the
ovarian stimulus, or to the menstrual nerve centre, and hence
dysmenorrhœa is an almost constant concomitant of the fœtal,
or infantile uterus.

The fœtal or infantile uterus, for purposes of study they may be classed together, is one of the most interesting and important expressions of developmental irregularity that the gynæcologist encounters.

It is obvious that the lower segment of the uterus has but little to do with the conditions that attend this imperfect development, unless cervical stenosis exists as a complication. Anatomically it is of interest as being greatly elongated and encroaching unduly upon the vaginal vault, thus giving rise to the impression that the dysmenorrhœa is mainly occasioned by obstruction to the menstrual flow; but an examination of the canal will show that the cause is located in the body of the uterus, in that portion which is especially concerned with the process of menstruation.

The causes that lead to the persistance of the uterus fœtalis have to do more especially with the forces that regulate and favor growth, rather than with those that concern development, for we will remember that at the period represented by this anomaly the type of human uterus has been reached, and that this type, minus growth, remains permanent.

Foremost among the causes of arrested growth are those that regulate local nourishment and control metabolism. Inherited vicious cell life, the effect of which is felt in unusual multiplication, in that which the cell gives out, and that which it absorbs or abstracts from the system in its process of division, as syphilis and tuberculosis, are not without influence in arresting the growth of the uterus. But the acquired diseases of infancy are more potent as etiological factors. The eruptive diseases, measles and scarlet fever, are well recognized as capable of causing such changes in nutrition as result in an arrest of uterine growth; and parotitis, because of the intimate relation that exists between the parotid glands and the genital glands, may be looked upon as capable of inducing changes that deprive the uterus of necessary nourishment at a time and period when the entire genital system requires an extraordinarily large supply of food.

Diagnosis—The existence of an infantile uterus is usually not suspected until puberty, when irregularities in the estab-

lishment of the menstrual function are observed. The flow is late to appear, and is usually scanty, but rarely painful. The general chlorotic condition of the patient and the history of a severe illness, typhoid fever, scarlet fever, or measles, may give rise to a suspicion of the cause of menstrual irregularity. Until the period of adolescence has passed, and that of maturity entered, the infantile uterus is sufficiently developed to perform the menstrual function indifferently well, but after this, when the other parts of the genital system have assumed their fuller powers of reproduction, the dwarfed organ can no longer perform the task put upon it. In its repeated attempts at decidual formation, an endometritis is induced, and perpetuated because of the narrow and long cervical canal, and flexion usually present. The dysmenorrhœa of infantile uterus, therefore, becomes of an obstructive type.

In the treatment of infantile uterus, but slight hope of improvement can be expected from the administration of medicine ; no system of treatment that has not for its basis a bettering of general metabolism, and does not seek to establish a demand on the part of the system for over-nutrition, as well as to supply such a demand, can hope to accomplish favorable results. Exercise, active or passive, that promotes pelvic circulation, should form a part of the treatment. The Brandt system of abdominal massage in competent hands, is well planned to promote pelvic circulation. The judicious use of the bicycle I have found a valuable adjunct in the treatment of pelvic derangements where I have desired to regulate the supply of blood to the pelvic organs.

If flexion of the uterus exists it should be corrected, and the organ maintained in position, preferably by a well-adjusted tampon, but if necessary, a soft pessary may be used.

When the question becomes one of defective drainage, the cervical canal must be dilated, especial attention being directed to the inner os, which is likely to be more contracted than the external opening. It may seem wise to amputate a portion of the elongated conical cervix, having in view the existing stenosis, and also the possibility that an operation induces changes in the circulation that make for the increased nourishment of the entire uterus.

In connection with general hygienic measures, some success has followed the use of a stem pessary in the treatment of uterus fœtalis. The theory of its action is based upon the development of muscles by use. The pessary within the uterus acts as a foreign body and causes the organ to contract, hence determines blood to it, and increased nutriment. The objection to the prolonged use of an intra-cervical pessary— and it must be worn for a considerable length of time to accomplish satisfactory results—is that which belongs to any foreign body. It may do more than we desire. Both of these objections may be overcome by careful attention to aseptic manipulation, by maintaining an absolutely aseptic genital canal as long as the pessary is worn, and by keeping the patient under observation until the tolerance of the uterus is demonstrated.

Chapman's hard rubber pessary retains its position in the uterus better than any other that I have used. It should be introduced under an anæsthetic, as its introduction requires complete relaxation, and is rather painful. The patient should remain in bed for four days, and then if there is no pain may be allowed to resume her usual avocation. After each menstruation the patient must be examined, and when this function is normally performed, the pessary should be removed, but if symptoms of imperfect function return, the instrument may be again introduced.

Should such measures fail to afford relief, removal of the undeveloped uterus may become necessary. The patient is sterile, and even should she become pregnant, could not carry the fœtus until full term. Therefore we have to consider the operation *per se*, that is, without reference to the question of reproduction. I do not favor oöphorectomy in such cases, unless it can be positively demonstrated that the ovaries are diseased. The fault lies in the uterus, and the uterus may still continue its efforts at decidual formation even after the ovaries are removed. Moreover, it is likely that the function of the ovaries is not confined to ovulation, but that they possess a glandular function as well, by which they contribute some essential essence to the well-being of the system. This should not without sufficient reason be withdrawn.

Congenital hypertrophy of the uterine cervix, is a persistence of the relative proportions that obtain between the lower segment and the body of the uterus, from the time of birth to the beginning of those changes that usher in the approach of puberty.

At the time of birth the cervix is double the length of the body, the os is large, and the anterior lip retains the size that characterizes the embryonic organ. At puberty these relations should be reversed, but if from that time the development of all the parts of the uterus progresses uniformly, while the body of the uterus may be of normal size, the cervix will be double its length.

The distinction between **supra-and infra-vaginal elongation of the cervix** is difficult to maintain; the lower segment of the uterus is affected as a whole, and not only that part which projects into the vagina, or that portion which extends from the vaginal vault to the internal os. Such an anatomical line can more aptly be drawn to mark the progress of acquired disease.

Hypertrophy of the lower segment of the uterus usually appears as a simple elongation of the cervix, though in rare instances the enlargement is club-shaped. Not uncommonly in aggravated forms the cervix is of such length that the os presents at the vulva, and even protrudes from the external genitals. In other instances the walls of the cervix are greatly thickened, and the portion of the uterus that occupies the vagina completely fills that canal, being in dimensions quite equal to the fundus uteri.

Pathologically the condition is **simple hyperplasia,** represented by an increase in the number of otherwise perfectly normal tissue elements. The uterine and vaginal mucosa are healthy, performing their normal functions. At least in the early stages, and if the elongation is confined wholly within the vagina, there is no alteration in the glands of the cervix, or of the mucosa of the os, there being no deviation from their normal structural type; but if the elongation is of such an extent as to present externally, and thus become exposed to the air, and possible mechanical irritation, the mucous membrane

which should be protected, and the glands whose opening ducts should be bathed with their secretion only, are liable to erosion and degeneration.

Diagnosis.—Congenital hypertrophy of the lower segment of the uterus may remain undiscovered until puberty; distortion of the cervical canal obstructing the menstrual flow then leading to an examination. Or the condition may remain undiscovered until marriage, when the hypertrophied cervix presents an obstacle to coitus, the destruction of the hymen permits the enlarged portion of the uterus to present at the vulvar orifice.

Treatment.—The treatment of hypertrophy of the cervix uteri will be surgical. Slight degrees of enlargement may require no attention, an expectant system of treatment being justifiable. Pregnancy, with its physiological hypertrophy of the corpus uteri, may be relied upon to accomplish something towards establishing the normal relation between the body and the neck, but beyond this nothing is of avail save removal of the hypertrophied tissues.

It is not always an easy matter to decide just how much of the uterine cervix should be removed. In this connection we have to consider that the entire organ is more or less dislocated, and that the superior boundary of the cervical canal, the internal os, may be below its normal position relative to the vault of the vagina and the broad ligament. Therefore, if we carry the line of amputation well up, concluding that all of the uterus that projects into the vagina is the subject of hypertrophy and must be removed, we may by so doing invade the uterine cavity, and render the organ incapable of holding a fœtus until full term, or possibly retaining the elements of impregnation, the ova or the spermatazoön.

Such mistakes may be avoided by careful examination of the cervix, both externally and internally. The external examination will frequently show a slight constriction, such as in the normal uterus marks the line at which the cervix is merged into the uterine body. With a judicious use of the uterine sound the ring of the internal os can usually be made out, and this will be the guide for marking out the line of

amputation. No matter how far this comes down into the vaginal canal, the amputation should not be made to within one inch of that point.

Another consideration will bear upon the treatment. The entire organ is frequently prolapsed, and with it there is a corresponding relaxation of the uterine supports, the round, broad, and utero sacral ligaments. Combined, therefore, with amputation of the lower segment of the uterus, there must be treatment to retain the body of the uterus in position, and strengthen the uterine supports. Shortening the round ligament, or ventrosuspension, may be necessary.

My **technique for amputation of the hypertrophied cervix** differs slightly from that which I employ in amputation for a lacerated cervix. (*Laceration of the Cervix, Chapter VII.*)

The structures amputated are comparatively healthy, and are not removed because of disease, but because they interfere with functional activity, or may become diseased. These facts make it possible to select the point of amputation with more reference to reconstruction of the normal cervical canal, than if we were controlled by the limits of pathology.

The cervix uteri being exposed, after ascertaining with the finger externally, or the sound internally, the location of the internal os, I make a circular incision around the cervix, through the vaginal mucosa, down to the muscular structure, about two inches from the point where the cervical canal joins the corpus. By traction on the distal portion of the pedicle, the mucosa on the proximal portion will retract, and the muscular structure can be cut through slightly above the line of incision of the vaginal mucosa. The incision of the muscular structures is conveniently made with curved scissors, and in such manner that when the cervical canal is reached its mucous lining will be slightly longer than the muscular stump.

If these steps of the operation have been carefully followed, the connective tissue stump will retract within its sheath of mucous membrane, and this, composed of the vaginal and cervical mucosa, can be brought together without difficulty.

For this purpose I prefer to use rather fine chromic catgut. In passing the needle care must be taken that it does not in-

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clude any of the musculature of the cervix ; and to render more accurate the adaptation of the cervical mucosa to the vaginal mucosa, it is well to first fix these in coaptation by anterior, posterior and lateral sutures, after which the intervening threads can be passed with ease.

The after treatment consists in assisting the overstrained uterine supports by packing the vagina with iodoform gauze. This I prefer to a pessary, for the reason that it combines support with an antiseptic application to the newly constructed os. The packing should be renewed every twenty-four hours, until repair is complete.

Should the uterus not remain in position with this treatment, and we must not be discouraged before giving it a fair trial, it may be necessary to hold the organ in place by suspension through the abdomen.

Congenital Stenosis of the Cervical canal is usually associated with hypertrophy of the lower segment of the uterus, or with the retained infantile type of uterus. Not only is the caliber of the canal inadequate for the discharge of menstrual blood, but its walls possess no elasticity, and are incapable of dilatation or relaxation under the stimulus of the periodical decidual membrane formation.

Any portion of the canal may be stenosed. If situated at the external os, the canal may be almost obliterated and form a part of the uterine cavity, there being no anatomical division between it and the uterus. More usually the contraction is confined to the region of the internal os, the external opening presenting nothing that is abnormal.

Clinically there is little to mark the exact position of the obstruction, save possibly that an excess of reflex symptoms seem to attend **stenosis of the os internum.** I have frequently observed this, and also an unusual degree of hyperæsthesia of the superior portion of the cervical canal, as shown when the sound is brought against the internal os during an examination. The local pain and reflex symptoms are out of proportion to the known pathology.

The lower segment of the uterus is so poorly supplied with nerves, that in the normal state it is quite insensitive to ordi-

nary stimuli, and trauma, and it is an interesting fact, which will properly receive more attention in the discussion of mechanical injuries of the cervix, that the suffering dependent upon stenosis is not local, but reflex; not in the cervical canal, but in the uterus, and more remote points of nerve distribution. The consciousness induced by touching the internal os is not at the point of contact, but is made manifest by spasms of pain at the base of the brain, by nausea, or an attack of angina. Hence dysmenorrhœa caused by stenosis of the cervical canal, obstructive dysmenorrhœa, is characterized by uterine, tubal or even more remote reflex suffering.

Diagnosis.—Stenosis of the cervix presents no difficulties in diagnosis. Dysmenorrhœa calling for an examination, the cervix is found elongated and rigid, and the external os small, and contracted. This contraction is frequently more apparent than real, a closer examination showing it to be limited to the mucosa of the portio. The sound, or probe, after passing with difficulty through the os externum, seemingly enters a normal, or somewhat ballooned cervical canal, to be again arrested at the os internum, which, because of the firmer resistance offered, may be regarded as the chief obstacle to the menstrual flow.

Referring to the anatomy of the lower segment of the uterus, we find an explanation of the greater proneness of the internal os to cause obstruction than any other portion of the cervical canal. While the cervix as a whole probably enters not at all into the function of menstruation, its mucosa, at least in its lower two-thirds differing from that of the body of the uterus, the mucosa lining the internal os and extending a few lines below that boundary, is identical with the uterine mucosa, and probably undergoes the same premenstrual congestion, hæmorrhage, and involution that characterize decidual formation in the corpus. It is easily understood what the effect of such a process in a contracted passage would be. How the perfectly normal swelling would assume abnormal proportions, and would completely close a stenosed canal, which under other conditions would be quite large enough to perform its function of drainage.

The results of stenosis of the uterine cervix are remote and far reaching. Not only are many forms of **hystero-neurosis** attributable to this cause, but we have also to consider the possible effects of imperfect drainage of the uterus. These are more serious than belong to complete retention of the menstrual flow, for in that condition the blood merely accumulates, the pathology being confined to that of distension, and consequent pressure; while in the imperfect drainage of stenosis, a communication is established with the vagina and external parts, and the very positive danger exists of infection being carried up through the uterus and Fallopian tubes into the abdomen—ascending infection.

The Treatment of Stenosis of the Cervical Canal has not been attended with the satisfactory results that the simplicity of its indication have led gynæcologists to anticipate. The treatment must be operative, and but one opinion obtains as to the principles upon which the operation should be based—permanent dilatation. The technique however varies, two propositions serving to classify the different procedures that have been suggested. Shall we depend entirely upon stretching the cervix; that is, by overdistension cause a temporary paralysis of the muscularis, or shall we add to this mutilation by deliberately dividing the cervical structures?

Theoretically little can be said in favor of simple dilatation. It is not to be expected that stretching muscular fibers will have more than temporary results. In a variable length of time the tissues resume their former condition. In practice failure generally follows this procedure. The first few menstruations are less painful, but gradually the cervical canal contracts and the dysmenorrhœa is quite as marked as before. After dilatation contraction is delayed by the use of various, mechanical means designed to keep the canal open until the process of repair has been accomplished, or until it is believed that the cervix has become permanently enlarged. But hitherto such means have only delayed the certain result—recontraction.

I therefore do not often depend upon simple stretching and the use of retention dilators for stenosis of the cervix uteri.

Occasionally a case, and such are mostly confined to stenosis of the internal os, will be improved by thorough stretching and packing with iodoform gauze, or, preferably, a piece of rubber drainage tube inserted in the cervical canal. The tube should be a rather firm catheter, and the eye inserted well into the uterus. The caliber of the tube I fill with iodoform wicking, and place a section of a larger sized tube around it to form a ring at a point corresponding to the external os. The drain is thus prevented from working into the uterus.

I have been more successful in permanently dilating the uterine cervix, when to stretching I add incision and excision. It is true that we have here to combat cicatricial tissue and its strong tendency to contraction, but I believe that this objection has been overstated, and that this operation with due regard to technique, offers the best prospect of curing cervical stenosis.

No minor gynæcological operations demand more perfect asepsis than those involving the uterine cervix, where the lymphatic supply and anastomosis pre-eminently favor infection. Therefore every detail of aseptic technique, thorough cleansing of the vagina and of the uterus itself, should be preliminary to dilatation of the cervix.

Dilatation of the entire length of the canal is essential to success, the stretching reaching well beyond the internal os. Of instruments for this I prefer Goodell's modification of Ellinger's dilator. This part of the operation should be done slowly to insure the most lasting results, and after the required divulsion has been attained the dilator should remain in position a few minutes while the cervical canal is irrigated with hot boric acid solution. This serves the dual purpose of maintaining asepsis, and assisting tissue relaxation by means of heat.

With a blunt pointed bistoury I then incise longitudinally, the length of the canal in several places, between the blades of the dilator. This is easily accomplished by rotating the instrument. The procedure is a combined incision and dilating, for the stretching precedes and follows division of the canal. The incision should be carried well into the structures

of the cervix; merely dividing the mucosa will have no effect upon the stenosis.

Unless especially counterindicated, it is well to curette, the region of the internal os receiving the most thorough scraping.

As we have seen, the majority of the cases of congenital stenosis of the cervix are concomitant with an infantile elongated cervix, which condition, at least favors the continuance of the mechanical obstruction to uterine drainage. In cases of infantile elongated cervix, combined with stenosis, my practice is to amputate almost the entire infra-vaginal portion of the cervix as a part of the technique for the relief of the contraction.

With a small volsellum—I have all my instruments as small as possible—I seize both lips of the os in such a manner as to close the mouth of the uterus, and with a straight bladed bistoury encircle the cervix at the point at which I wish to amputate. The incision is carried towards the cervical canal, and upwards, so as to form a crater like wound, when the mass held in the volsella is finally cut out. The cervical mucous membrane is then stitched with fine chromic catgut to the vaginal mucous membrane, and the cut uterine tissue completely covered and protected against absorption through the vagina.

The success of the operation for cervical stenosis will depend upon the efficiency of the means employed to keep the canal open until healing is completed, and the permanence with which the dilated structures accommodate themselves to the requirements of uterine drainage.

Much mechanical ingenuity has been expended upon this matter ; with but few exceptions the results have not been satisfactory, the canal in varying lengths of time returning to its former degree of contraction.

I formerly packed the dilated canal with iodoform gauze which I removed in twenty-four hours, replacing it at the same sitting, after an intra-uterine douche, with a packing of like material. The process was repeated every forty-eight hours until the canal seemed to retain the desired patency. I have also used the glass and rubber dilators. My best results, however, have been obtained with the use of rubber catheters—No. 16 to 20—introduced with the eye well inside the internal

os. A handkerchief of iodoform gauze placed on the catheter before its introduction will favor its retention within the canal. To prevent the catheter from slipping into the uterus, I place an arm of a larger tube at the level of the external os. This method has already been described.

The above method of permanent dilatation affords perfect drainage of the uterus, and I think has been followed by less contraction than any other method that I have used. The catheter can be removed and cleaned with ease; this should be done at least every three or four days, and, if need be, can remain in position during the first menstruation. This I consider of no small advantage, for contraction of the cervical canal—especially that portion, the mucosa of which is continuous with the corpus—is prone to accompany and follow menstrual involution.

The time of operating for cervical stenosis is probably not without influence upon the results. When the uterine tissues are softening in their preparation for the menstrual process, dilatation is accomplished with less trauma than during the resting period. Therefore, other things being favorable, I select a week or ten days before the expected menstruation as the most favorable time for operating. This will afford opportunity for changing the drainage tube several times before menstruation, and also makes it possible to allow the tube to remain in the cervix during the menstrual flow. When this is found to be impracticable, it should be reintroduced immediately upon the cessation of the flow.

Permanent results cannot be looked for, unless the canal is kept mechanically open for at least two months after the divulsion. I therefore make it a practice to keep the patients upon whom I have operated for stenosis of the uterine cervix under observation for two and three months. I do not find it necessary in every case to have them wear the drainage tube constantly during that period; sometimes it may be removed for several days, and then reintroduced, the course followed depending upon the condition of the cervical tissues, and their disposition to contract.

Congenital laceration of the uterine cervix, or more properly

congenital fissure of the uterine cervix, is an anomalous develop-
ment, represented by a persistence of the embryonic type be-
fore the developmental buds of which the cervix is formed,
fuse laterly to make the cervical canal. This irregularity dates
from the fifth month of embryonic life, at which time the
nodules that form the anterior and posterior lips should fuse
together. Failure results in a unilateral, or bilateral lacera-
tion. The edges of the fissure preserve the same histological
features that characterize the external os, the transition from
squamous to columnar epithelium being observed at the line
where the vaginal and cervical mucous membranes pass into
each other.

The cases of congenital fissure thus far reported have been
few, and their discovery quite accidental during an examina-
tion for some other disorder. It is, however, conceivable
that a congenitally imperfect uterine canal would cause no
functional disturbance prior to the development of the uterus
that attends the establishment of menstruation, and that then
the increased size of the uterus, failing of the support afforded
by the normally developed cervical canal, would cause a re-
laxation and prolapsus of the endometrium. I am inclined to
think that congenital fissure of the uterine cervix, not includ-
ing more than the musculature, is responsible for some cases
of cervicitis and ectropion of the external os found in young
girls. The real contour of the os is lost, for the support furn-
ished by the firm cervix and os to the cervical membrane is
withdrawn, and in consequence there may be a relaxation and
pouting of the mucous membrane, with erosion and glandular
hypertrophy.

Congenital fissure of the cervix in the unmarried may lead
to a mistake in diagnosis, the question of maternity errone-
ously entering as an etiological factor. Considering the issues
at stake, such a mistake can find no excuse, when we consider
the possibilities of a congenital defect.

Clinically, congenital fissure of the cervix presents no con-
ditions that differ from those that belong to mechanical lacer-
ation. (*See chapter VIII.*) As etiological factors in secondary
disease, they deserve the same consideration, and call for the
same treatment.

If erosion of the os is present this cannot be permanently removed until the laceration is closed and the circulation of the cervix restored.

Treatment.—Not every laceration of the cervix, congenital or acquired, will necessitate an operation, but when the pathology of the os can be traced to a congenital laceration, and other conditions excite the suspicion that this simple benign process may assume serious neoplastic changes, the laceration should be repaired, or, because malformed structures are especially prone to degeneration, the lower segment of the uterus amputated above the angle of the laceration. The operation will be described when treating of the lacerated cervix of parturition and its sequelæ.

Congenital atresia of the uterine cervix, is due to arrested development of those portions of the Mullerian ducts which by fusion form the lower segment of the uterus. Fusion on the median line is perfect, but the process of hollowing out of that portion of the ducts that forms the canal between the internal and external os is imperfectly accomplished or wholly checked. There thus exists no communication between the body of the uterus and the vagina, the former cavity being closed, save where it opens into the abdomen through the Fallopian tubes.

A form of congenital atresia has been described that is the result of an intra-uterine adhesive inflammation of the mucosa of the already patent cervical canal, which occurs between the period of development and birth, but such is a **spurious atresia,** being the result of disease rather than of developmental defects. In **true atresia** there is an entire absence of mucous membrane, the cervix being represented by a solid body. In spurious atresia mucous membrane is present, representing the cervical canal, though its surfaces have adhered together.

Clinically the distinction is unimportant, but of vast moment when the question of treatment is discussed.

Congenital atresia has only in rare instances been found as a single developmental defect; it is commonly associated with other malformations, double uterus and double vagina, in which case one side of the genital canal may become impregnated.

Anatomically, this variety of congenital atresia of the uterine cervix can be distinguished according as the imperforation is confined to the internal or the external os, or involves the entire length of the cervix.

The condition is not recognized until puberty, when menstrual suppression leads to a physical examination as to the cause, other factors being excluded. The amenorrhœa due to atresia belongs to the obstructive type, for the developmental defect may be confined to the lower segment of the uterus, while the parts superior to the internal os, the body of uterus, the ovaries and Fallopian tubes are fully developed and functionally active.

Whether the menstrual fluid is retained in a single uterus, or in one horn of a double uterus, the symptoms are the same. A distinct, ovoid pelvic tumor, tense and fluctuating, situated laterally or in the median line, according to the parts involved, bulging into the vault of the vagina, will exist. This tumor increases or becomes more tense at each menstrual molimen, when the subjective symptoms support unmistakably the effort of the uterus to discharge its contents.

With a single uterus the **diagnosis of cervical atresia** is made without difficulty. There is either no external os or a depression exists in the lower uterine segment that corresponds to that opening. The sound passes only a short distance, and it is seen that there is no communication between the vagina and the uterus; or there may be no vagina.

If a bicornate uterus and vagina exist, the diagnosis will rest upon the recognition of this condition. Menstruation will take place from the perforated canal, but symptoms of retention will accompany the physical signs of a second uterus in which there is an obstruction to the menstrual flow. The double organ having been located a sound cannot be passed into its cavity.

Treatment.—The treatment of congenital atresia of the lower segment of the uterus involves problems of grave surgical importance, and touches the reproductive life of the subject of this anomaly of development. An outlet must be provided for the menstruating organ, but how will this be maintained?

Having tunneled through the solid cervix, how are we to keep this passage open? We have no mucous membrane to assist in doing so, and if we succeed by means of stem pessaries in preserving a canal until its walls are healed, these walls are after all composed of cicatricial tissue and will contract or adhere together until the primary condition of atresia reasserts itself.

Upon purely theoretical grounds, if the atresia is confined to one side of a bicornate uterus, a more permanent vent might be made through the septum that divides the two uteri, than is likely to follow incising the dense cervix. Contraction of the structure composing this usually thin wall would not be followed so early by closure as we may expect when an artificial canal is made through the solid neck of the uterus.

While impregnation may take place in one horn of a double uterus, it is probable that the opening established into the closed uterus would interfere with carrying a foetus to full term. In this class of cases, also, hysterectomy may be the only choice of treatment that we have to offer the patient.

If this form of **gynatresia** affects a single uterus the case must be looked upon as well nigh hopeless, and eventually, after a not too long trial at forming a cervical canal, will justify removal of the anomalously developed organ. The patient is sterile, and hysterectomy, without the necessity of including the ovaries, in no way changes her child-bearing powers.

CHAPTER III.

ANATOMY OF THE UTERINE CERVIX.

The neck of the uterus is that portion of the genital canal that extends between the opening of the uterus into the vagina—external os—and the opening into the body of the organ—internal os.

In embryonic life, **the lower segment of the uterus** occupies more than two-thirds of its length, but the relation between the upper and lower segments gradually changes, so that at puberty the corpus is found to be the largest portion of the uterus. This represents the type of the nulliparous human uterus, and will serve as a basis for the present study.

The uterine cervix encloses a canal, which establishes a passage between the vagina and the uterus, that serves the dual purpose of providing a duct for conveying the male fertilizing elements into the uterine receptacle, and of protecting the uterine cavity against infection, by means of a peculiar alkaline secretion of the glands, with which the canal is abundantly supplied.

There is nothing to show that the lower segment of the uterus is concerned, either with pregnancy or parturition. It probably has little to do with retaining the fœtus in the uterus, for the contraction of the uterus, not the dilation of the os—at full term the cervix has become obliterated—induces labor and forces the child from the uterus. With menstruation the lower segment of the uterus has probably more to do. The mucosa of the upper portion of the cervical canal closely resembles the mucosa of the body of the uterus, and probably undergoes changes similar to those in the corpus that belong to menstruation.

It has been demonstrated that at least the inferior third of the cervix, **the portio vaginalis,** is an erectile organ, and it is probable that this function, to a lesser extent, belongs to the entire cervical body, and that under the stimulus of a decidual growth

not only serves to adapt the canal to the axis of the uterus, thus favoring the flow of menstrual blood, but also exerts somewhat of a pumping action, having the same object in view. During coitus the erectile function of the cervix is exercised to favor impregnation, to open the os, and draw the spermatozoa into the uterus.

The lower segment of the uterus, the cervix uteri, is bounded in its long axis by the external os below, and the internal os above ; latterly, for its inferior third by the reflection of the vaginal mucosa, for its upper two-thirds by the inter-cellular connective tissue that separates the broad ligament at its reflection from the uterus ; anteriorly by the reflection of the vaginal mucous membrane for its lower third, and for its upper two-thirds by the posterior wall of the bladder ; posteriorly by the reflection of the vaginal mucous membrane for almost its entire length, the peritoneum that lines Douglas' cul-de-sac passing down to the reflection from the upper part of the vagina.

The uterine cervix, therefore, will be seen to rest in the upper end of the vaginal tube, into which it is invaginated, carrying the mucous membrane with it as a reflection on its surface.

The long axis of the cervix uteri describes almost an acute angle with the long axis of the vagina, though this is subject to considerable variation, for the most part depending upon the degree of bladder distension, and intra-abdominal pressure.

The length of the adult uterine cervix varies. In nullipara it measures about one inch, or something less than half the length of the entire uterus. In multipara there is a return to the embryonic proportions, the cervix becoming about two inches long, or two-thirds the length of the whole organ.

The lower segment of the uterus, in common with the entire organ, is composed of three distinct anatomical tissues. A very thick muscular substance divided into three layers; mucous membrane which lines the cervical canal; and an external serous covering—peritoneum—which covers only a part of the posterior surface of the cervix.

The muscular layers, unstriped muscular fibers, form by far the largest part of the cervix, and give shape and consist-

ence to the organ. The division into three layers is not as clearly made out in the lower segment of the uterus as it is in the upper segment, but the external layer which lies next to the serous membrane has its origin in longitudinal bands that begin in the cervix, and pass up over the body of the uterus. The inner layer is chiefly useful in supporting the blood vessels as they ramify on the uterus. The third layer, the muscular mucosa, constitutes the largest portion of the thickness of the cervical walls. On it lies the mucous membrane. The fibres of this layer run transversely in the cervix, and in concentric rings in the body of the uterus. They form the *plicæ palmatæ* of the cervical canal, and the sphincters of the external and internal os.

The muscle elements are firmly bound together in irregular bands, that are woven about the arteries of the uterus. Within the muscular layers, but more abundant beneath the mucosa, have been found groups of round cellular bodies, that are believed to be young muscle cells.

The cervical canal is fusiform in shape, and lined with a mucosa that is a continuation of the covering of the vagina, and the body of the uterus. It differs however from that of the corpus in being thicker and tougher, somewhat paler, and is thrown into numerous rugosities, which cease at the level of the internal os. The upper two-thirds of the cervical mucous membrane is lined with a single layer of cylindrical columnar, epithelial cells, the lower third with laminated flattened squamous, epithelial cells, similar to the covering of the portio vaginalis.

In the depressions between the *arbor vitæ—plicæ palmatæ—* are found the orifices of numerous saccular and tubular glands that secrete a thick, viscid alkaline mucus. These follicles are lined with non-ciliated epithelium, and though generally simple sometimes present a racemose arrangement.

Beneath the epithelium there exist minute cysts, **ovula Nabothii**, that contain a viscid mucus, identical with that of the cervical glands. These bodies are found more frequently in adult life, and probably owe their origin to a separation from the racemose glands of the cervix. They project from the external os and lower portion of the cervical canal.

The internal os, or opening by which the cervical canal communicates with the corpus of the uterus, is marked by a slight constriction, caused by an increase in the bundles of transverse fibers of the muscularis, already referred to as the **sphincter of the os internum.** There is no distinct anatomical line of demarcation in the mucosa, between the cervix and the body, that of the body being carried some distance into the canal. Functionally this is one with the epithelial lining of the uterus.

The external os, or opening by which the cervical canal communicates with the vagina, is also marked by a slight constriction in the cervical canal, caused by an arrangement of the transverse fibers of the muscularis—**external sphincter.** In nullipara it is marked by a very slight depression in the cone-shaped vaginal portion of the cervix, but in multipara it is much larger, and frequently irregular in outline from the mechanical injuries received during parturition.

The external os is divided into an **anterior and posterior lip,** not easily distinguished in nullipara, but readily made out in those who have born children. The angle that the cervix maintains to the vagina gives an appearance of the anterior lip being longer than the posterior. This is marked in multipara, especially if the cervix has been lacerated, but otherwise is more an appearance than an actual condition. The lips are joined together laterally, and do not present as separate parts of the os until mechanically drawn apart at the commissure, which may be retained from embryonic life.

At the external os the transition is abrupt from the epithelium which lines the cervical canal—columnar—to that which lines the vagina—squamous epithelium. The principal difference, however, between the cervical and vaginal epithelium is, that the former is rich in glands that secrete an alkaline substance, while the latter, as it furnishes a covering for the portio vaginalis, contains no true glands, the acid mucus found on that membrane being due rather to a shedding of the superficial epithelial cells, than to a true glandular secretion.

The lower segment of the uterus is supplied with blood from two sources, the right and left uterine arteries, branches of the

anterior division of the internal iliac artery.   They form a vascular network around the cervix, penetrating the muscular tissues.   On a level with the internal os the anastomosing branches form the circular artery of the uterus, and above this very close anastomosis is established with the ovarian arteries—branches of the abdominal aorta. **The veins of the cervix** accompany the arteries and empty into the internal iliac vein.

The uterine cervix is liberally supplied with lymphatics, which form a network that covers it and the fundus.   They originate as openings in the mucous membrane of the uterine canal, are lined with endothelium, and form similar spaces in the muscular tissue.   The canals ramify, surrounding the uterus and vagina as a fine network of lymph vessels.   Those that originate from the cervix are on each side, gathered into a channel, which, after entering the glands of the pelvis, follows the course of the uterine vessels and empties into a large lymphatic gland that is situated at the bifurcation of the common iliac artery. Only remotely do these lymph channels communicate with the inguinal glands.   The lymph channels of the body of the uterus pass through the meso-salpinx into the lumbar glands, and also in another direction, involving the deep inguinal glands.

So insensitive is the lower segment of the uterus, especially in the region of the internal os, that **the presence of nerves** has been questioned ; there exists, however, a ganglion on either side of the cervix—**cervical ganglion**—made up of branches from the hypogastric plexus, and second, third and fourth sacral nerves.   From this ganglion branches pass to the uterus, vagina and bladder.

CHAPTER IV.

THE GENERAL CAUSES OF THE DISEASES OF THE UTERINE CERVIX.

Disease is the antithesis of health, and cannot exist as a primary condition, but must always be secondary to health. In other words, abnormal action has no other standard to be judged by than normal action, and has no entity apart from being the negation of health.

We are thus brought to the conclusion that **pathology must have its origin in physiology;** that pathological processes are initiated in physiological processes, and that for disease, however varied its nature, there will always be found a prototype in health. Moreover, if we contemplate the unknown forces that go to make up life, we reach a further conclusion—that inasmuch as all vital processes exhibit characteristics which establish for them a common source, **the vitality of disease is one with the vitality of health.**

Applying this hypothesis to the matter of neoplasms, which constitute a large proportion of the diseases that affect the uterine cervix, we have for a pathogenetic basis a perversion of those vital forces within the body that should make for health. Such forces are potent in the germ and sperm cell; during the formative period of embryonic life, when swift and radical tissue differentiations and organic developments are taking place; less frequent during fœtal life; probably but rarely after the organic form has become moulded.

Mechanical irritation, perversion of function, and the local invasion of microbes, all establish conditions favorable for provoking into activity developmental irregularities that have their origin in the plastic formative period of embryonic life, a period when the proteid molecules that make up the protoplasmic substance of the animal body may be considered especially active in forming the "side chain" atoms that perform so important a function in nutritional economy, and under the
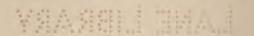
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influence of toxines, deprive the central group of molecules of attributes required in the performance of their normal function.

Unless in the realm of speculation, which admits of the most varied hypotheses, our present knowledge of disease does not warrant us, while seeking its causes, in placing reliance upon less positive data than those furnished by the study of tissue building, and functional activity. That the real causes of departure from the physiological standard exist behind such tangible manifestations of unhealth we cannot doubt, but thus far they have eluded our positive knowledge, and still remain beyond our demonstration. We cannot analyze the forces that make for the well being of the organism; we are equally powerless to say why these become perverted, and so menace health. When we have come to the chemical and physical activity that is correlated with every life phenomenon, and vital process, we have reached the limit of our knowledge, and stand before an at present insoluble mystery. We must therefore study the very earliest evidences of departure from the healthy standard, such evidences as can best be demonstrated in irregular tissue construction, atavistic organic formation, faulty metabolism, and perverted function.

As already stated, a large proportion of the diseases affecting the uterine cervix as well as the body of the organ are neoplastic, and when not such primarily, frequently become so by the action of **extrinsic causes,** accidentally operative, or conditions that are the outgrowth of perverted function, **intrinsic causes.** In the main, however, we have to deal with a local histogenesis, the causes of which are indigenous in the tissues in which the aberrant cell mass develops.

Foremost among the causes of disease of the uterine cervix I would place conditions belonging to embryonic life, conditions that determine the differentiation of the blastodermic layers, and by virtue of which the uterus is gradually molded into shape through the development of permanent structures, and the disappearance of those that have no part in the mature organ, or become vestigial only.

All pathological new formations are characterized by erratic cell life,

the error showing itself either in vagrancy, that is, misplaced wandering cells, irregular development, irresponsible arrangement or useless multiplication. The development of the uterus from the Wolffian body suggests that in irregularities of developmental sequence exist the possibility of an initial step in the development of some uterine neoplasms, especially those that have their origin in cell sequestration.

It will be remembered that the mesoblast, from which the Mullerian duct and genital ridge are developed, is formed from the epiblast and the hypoblast, and that the germinal epithelium which produces the ova also arises from the mesothelium of the coelum, a probable derivative of the hypoblast, or future peritoneum, not far from the invagination of the mesothelium that forms Muller's duct.

Some **dermoid cysts** owe their origin to such germ cells, vagrant cells that have wandered from their true matrix—the genital ridge—and become domesticated in other tissues, and it is probable, considering their high degree of vitality, that these cells, as well as the primordial ova, are capable of exerting an influence upon the mesoblastic cells of Muller's duct, with which in embryonic life they are so intimately associated, such influences tending to impress embryonic characteristics upon cells that should progress rapidly to mature types.

It will also be remembered, that while in early embryonic life the germinal cells of the blastoderm resemble each other, they soon differentiate into an outer, inner and middle layer, from which are developed organs of varied structures and tissues. Epiblastic and hypoblastic, or epithelial cells may remain encapsulated in the mesoblast—connective tissue—and in the organs developed from this middle layer, mesothelium, form the nucleus of aberrant cell neoplasms.

Then, again, the Wolffian duct is vestigial in the adult female, its remnant, **the epoophoron and the paroophoron,** performing no function. Moreover, the Wolffian duct is of epiblastic origin, and when it fails through developmental irregularities to disappear from the lower segment of the uterus there exists an embryonic centre of epiblastic, epithelial cells, in an environment of mature mesoblastic, connective tissue.

The method of formation of the uterus, by fusion of the two Mullerian ducts, is favorable to errors in development, for at the line of union vagrant cells are liable to become incorporated, and in the disappearance of the septum, cells may remain and become incorporated in the mature uterine segment. **Malformations of the uterus are entirely due to arrest of developmental powers.** Double uterus and vagina owe their origin to a failure of the Mullerian ducts to fuse in the median line; congenital laceration of the cervix, to failure of the lateral commissures to unite. It seems probable that this is always a weak point in the lower segment of the uterus, as evinced by the well nigh universal bilateral laceration of the cervix that follows parturient dilatation. There is no other reason for congenital defect or weakness at the lateral lines of embryonic fusion; for the giving away of the cervical canal at this point in preference to any other part.

Anatomically, the lower segment of the uterus offers conditions that invite rather than discourage the development of disease. The arrangement of the cervical lymphatics calls for special notice in this connection, as well as the lymphatic channels, which from their numerous ramifications and insufficient valvular arrangement favor the conveying of disease to remote parts. A very large proportion of the malignant growths that develop in the cervix have their origin in the glands of that region, and, hence, we may conclude that in the number of these glands and their aberrant extensions exist a predisposition to neoplastic formations.

The transition from columnar to squamous epithelium that takes place just within the external os is not always accomplished with exactness, and there not infrequently result islands of papillomatous cells well up in the cervical canal, or the opposite, cylinder cells remain down on the portio. **From these foreign elements, in either situation, epithelioma frequently develops.**

Turning to the development of the blood vessels in relation to the musculature, we find the former very numerous, more so, however, in the superior segment than in the inferior segment of the uterus, and that the extraordinary manner in which they are interwoven favors a process of fragmentary isolation

of the muscular mucosa similar to that observed as the result of irregularities in segmentation of the cervical racemose glands. Such inclusions become **the germs of uterine myomatama,** rarely observed in the cervix, because conversely to the corpus of the uterus, it is rich in glands, but not in blood vessels or muscular tissue.

The functional activity of the uterus is probably only remotely a cause of the diseases of the uterine cervix. Save in its superior part just outside of the internal os, the cervical canal participates but little in the menstrual function. The mucosa of this part sympathizes with the mucosa of the corpus and undergoes changes similar to those that characterize the decidual formation of the body of the uterus, but probably does not proceed to complete decidual tissue formation. This portion of the cervical canal, therefore, is subject, though in a lesser degree, to the same pathology as that which has its origin in irregular decidual growth—*deciduoma malignum.*

Perhaps more potent as an etiological factor than the menstrual function, *per se,* is **the physiological oft repeated unfolding** and **folding-up of function,** as well as the sudden development that attends puberty. Such changes, if the physiological resistance, natural inhibitory influence, becomes lowered from one cause or another, are well calculated to call into activity, hitherto latent, embryonal cell segments that may remain in the uterine tissue. It is a significant fact that epithelial neoplasms are especially frequent during the period covered by the functional activity of the reproductive system.

The accidents of parturition, and mechanical injuries are to be classed among the chief causes of disease of the lower segment of the uterus. Possibly not to the same extent as formerly taught, when a lacerated cervix was considered an almost certain precursor of "cancer," and the development of "cancer" was looked upon as proof of the pre-existence of a laceration, but more broadly as irritants, offering local conditions of disturbed circulation and erratic cell development; exposure of surfaces favorable for the invasion of micro-organisms, and the removal of support for the cervical mucosa, thus opening a door for extraneous influences, and breaking down the barriers that the normal os offers to the introduction of diseases from without.

Acquired local predisposition to disease, the outcome of oft re-
peated injury, is observed with especial frequency at the os
externum as the result of parturition, or as the result of any
systemic condition that tends to alter the normal secretion of
the cervical glands.   If the secretion becomes acid, the mucus
plug that normally closes the uterus no longer exists, and not
only is the cervical epithelium subjected to a chemical irritant,
but its natural protection is withdrawn and the door opened
to bacterial and other irritants that are capable of reducing
the inhibitory influence of the tissues in which the embryonal,
or acquired matrix is situated.

The question of heredity applies with equal force to the devel-
opment of diseases in any portion of the uro-genital system.
I say the uro-genital system, because some of the cells of this
system are possessed of special vitalizing powers, and, being
associated with the reproduction of the individual, are more
instrumental in the transmission of characteristics than the
cells of other embryonic parts.   Concerning the reproduction
of racial and family construction, we must admit the possi-
bility of transmitting abnormal or irregular tissue building, or
at least the tendency to such, to the off-spring.   It is not
known to what extent the abnormal potentiality must become
incorporated within the parent to render it capable of trans-
mission, but the tendency of nature is to reproduce the normal
and not to deviate from established forms.   To this constantly
active aim of the organic forces to destroy and counteract the
tendency to abnormal tissue building, we owe much of the
immunity from the inheritance of disease.   The suggestion to erratic
cell formation, cell vagrancy and the tendency to develop-
mental irregularities, may be transmitted by means of the
germinal cells to the embryo, and appear in the adult; or be-
ing transmitted, are by the reasserting of the normal forces—
physiological resistance—crushed out, and thus cease to exist
as potentials for unhealth.   Even though not destroyed, such
pathogenetic centers may remain quite dormant until roused
into activity by local changes, in no way connected with or
dependent upon the deeper local heterology.

Thus for the development of the diseases of the lower seg-

ment of the uterus, both inflammatory and neoplastic, we have as etiological factors, *first*, the embryonal development which concerns misplaced vagrant cells, the result of developmental irregularities; *second*, the physiological activity of the reproductive organs which furnish in a preëminent degree all the conditions that favor hypernutrition and unhealthy cell multiplication, and *third*, the mechanical irritation to which this part of the uterus is especially liable in the performance of its function.

CHAPTER V.

GYNÆCOLOGICAL ANTISEPSIS.—OPERATIVE TECHNIQUE.—POST-OPERATIVE TREATMENT.

The vagina and uterus are naturally aseptic. The construction and function of the vaginal canal, apart from their relation to the scheme of reproduction, are designed to protect the uterus against the invasion of pathogenic micro-organisms, and to render the canal sterile and unfit for the development and growth of disease germs.

. The vagina when closed forms a deep transverse slit in the connective tissue of the pelvis, its anterior and posterior walls being glued together with the stringy secretion from the mucous membrane with which they are covered. In multipara, who suffer from unrepaired injury of the pelvic floor, or elderly women of lax fiber, the vagina loses its characteristic shape, and assumes the fórm of an open tube, thus permitting disease germs more ready access within the **introitus vagini.**

The principal factor in maintaining asepsis of the genital tract is the acid secretion of the vaginal mucosa, and this acidity is probably induced by the **vagina bacillus,** a rod-shaped organism always found in the healthy vagina. When these organisms are present in numbers, the secretion is strongly acid, and pathological bacteria, even **strophytes,** cannot multiply or assume dangerous proportions. When the bacteria are absent the secretion from the vagina becomes alkaline, and pathological micro-organisms find a congenial soil for development and growth.

The vagina bacilli probably possess, in addition to the chemical reaction which they induce in the vaginal secretion, the power of destroying pathological organisms—**phagocytosis**—of digesting them, or otherwise rendering them inert and harmless.

Natural asepsis is not equally active in the vagina at all times and under all conditions. Until opened the healthy vagina is sterile,

but in the majority of gynæcological cases that come to the surgeon for examination the canal has been opened, either by previous examination, coitus, or morbid discharge from the uterus, hence, pathological micro-organisms in overpowering numbers may be introduced and the character of the secretion chemically altered.

It has been observed that during menstruation, and for a few days following, the vaginal secretion loses its acidity, becoming distinctly alkaline. A similar change takes place during the four or five weeks following labor, inducing conditions in the vaginal secretion favorable to the development of pathological micro-organisms.

These alterations in the reaction of the secretion of the vagina during the menstrual molimen and the lying-in period, probably increase susceptibility to septic infection at such times, and it seems within probability that extended observation will establish an etiological relation between these less protected periods, when nature's defense against disease-generating germs is weakened, and the development of a wider range of gynæcological pathology. The essential elements of new growths already present in the genital tract may receive their impulse to proliferate through such conditions, and specific germs associated directly with the life history of neoplasms may find a ready lodgement that would be impossible at another time.

The mere presence of pathological micro-organisms in the vagina, however, is possessed of slight clinical significance, for they cannot be absorbed by the healthy mucous membrane, nor do they pass beyond the healthy lymphatic glands, or within the normally protected uterine os; the mucous membrane is a protection against the invasion of the deeper structures, the lymphatics possess marked powers of digestion of the disease cells which they take up, and the cervical plug of mucus arrests the passage of micro-organisms within the uterus. **Pathological micro-organisms assume importance** in the presence of destruction of the vaginal mucosa, or disease of the cervical lymphatics, by means of which the deeper structures are opened to their invasion.

In considering **the question of gynæcological sepsis** we will bear
in mind that suppuration, **the presence of pus, is not necessarily a
factor in septic poisoning,** the essential element being the particular
cocci, the mere growth of which generates the toxine that so
profoundly affects the system. Suppuration indicates bacterial
activity and marks a phase in the cycle of the growth, develop-
ment and nourishment of pathologic micro-organisms, but pus
per se is neither the cause of sepsis nor capable of extend-
ing septic intoxication, save as it bears the septic cocci, or
furnishes the pabulum that stimulated them to generate
ptomaines.

Another fact that urges itself upon us is a **discrepancy be-
tween the multiplication of bacteria in the blood and the degree of in-
toxication.** The system, from causes frequently difficult to
determine, may early become completely overwhelmed with
the poison, when neither the blood nor the tissues show ex-
tensive multiplication of the micro-organisms. Two factors
contribute to this condition; the low degree of phagocytosis
present, and the variety of cocci that generate the particular
ptomaine, it having been observed that the virulence of the
poison bears no direct relation to the proliferation of the es-
sential micro-organism.

The principal pathological micro-organisms with which surgery is
concerned are the **pyogenic bacteria,** or those associated with pus
formation.   They are classed with the cocci, though it is prob-
able that this characteristic rod grouping neither determines
their life history nor their toxic production.   As an example,
the **staphylococcus epidermidis albus** is but mildly pathological. It
exists very generally in and on the skin, but rarely shows the
least tendency to pus formation. This staphylococcus has been
found in healthy wounds, apparently in no way interfering with
their normal healing. It is fortunate that this organism pos-
sesses such low pathological properties, inasmuch as its ex-
tensive distribution and deep situation in the tissues, where
bactericides can not penetrate, would otherwise place it among
the most formidable with which we have to deal. Its virulence
probably depends upon a **mixed infection.** Alone, or in the
presence of inhibitive forces, it is quite inocuous, but with

the **staphylococcus pyogens aureus, or albus** it assumes a virulence that does not belong to it alone.

The **Staphylococcus pyogens aureus**, the **golden staphylococcus, is the most widely distributed pyogenic bacteria,** and, therefore, the most important with which the surgeon comes in contact. It is found in water, beneath the finger nails, in the skin, in the air, and in the mouth. It is present in abscesses wherever situated, and is the source of septic intoxication in puerperal septicæmia, and that following gynæcological operations. It is **the most frequent pathological micro-organism found in the vaginal secretion,** and alone, or mixed with the staphylococcus pyogens albus, a less virulent variety, is probably the source of most of the infections that take place through the vagina.

The **Staphylococcus pyogens albus,** or **white staphylococcus,** resembles the **aureus** in method of growth, but is less widely distributed and less virulent. The two varieties are usually found together. Possibly the degree of virulence in an individual case depends somewhat upon the proportion with which the two cocci are represented; certainly notable differences are observed in this respect, the same bacteria producing various degrees of intoxication and areas of dissemination.

The **Staphylococcus pyogens,** though with a widely spread habitat, is not commonly found in the vaginal secretions, and, therefore, not as frequently the source of septic intoxication through this avenue as the other **staphylococci.** They are the essential bacteria of erysipelas, and as such a cause of post-operative peritonitis. They are also associated with puerperal infection, but their presence and toxic influence can usually be traced to direct transmission from erysipelas, or other forms of phlegmon.

The **Streptococcus pyogens** is known to be present in acute pleuro-pneumonia, pleurisy and empyema, endocarditis, and especially the angina and pseudo-membranous angina that complicates scarlet fever. From these sources by direct conveyance the vagina can easily be infected with the most virulent pathological micro-organisms, against which its natural anti-bacterial function is powerless to protect the uterus and peritoneal cavity. It becomes, therefore, of the utmost importance for the surgeon, and especially the gynæcologist, to observe every

possible precaution should he be in attendance upon a case of **streptococcus pyogens phlegmon,** to render himself thoroughly aseptic before he undertakes an operation involving the female genital organs, or the peritoneum.

The recognition of the **micrococcus gonorrhœa,** or **gonococcus,** as an important factor in the etiology of pelvic peritonitis and cellulitis, belongs to a comparatively recent period in medicine. The characteristic of remaining dormant until forced into activity by nutritive conditions possessed by this cocci in a preëminent degree, undoubtedly has given a false sense of security when gonorrhœa is known to have been present, and has led to peritoneal infection through neglect of precaution in the preparatory treatment of an operation. In this place it is well to emphasize the necessity of securing the entire history of any case that is to come to an operation. If this history includes a recent or remote exposure to gonorrhœal infection, the clinical features of a past gonorrhœa should not satisfy us of a cure, the vaginal secretion should be rigidly examined, and no operation undertaken unless urgently called for, as long as the gonococci can be demonstrated. In the presence of pelvic exudates due to gonorrhœal infection, any operation involving the uterus, the pelvic peritoneum, or cellular tissue, should be preceded and attended by every possible precaution to eradicate and resist the invasion of the micro-organisms.

The **bacillus ærogenes capsulatus,** or **air producing bacillus,** is of quite rare occurrence in gynæcology. It is a constant inhabitant of the intestines and of ordinary soil. It is not a pus producing organism, but is associated with the formation of gas, is found in the blood vessels during puerperal septicæmia, and is always present in emphysematous gangrene. Generation of gas in the vagina may be due to the presence of this micro-organism. In septic cases it is always associated with the **staphylococcus pyogens,** but cannot be regarded as pathologic, unless in a mixed infection. Probably this mixed organism generates only a mild toxine, and that its injurious effects are due more directly to pressure of gas on tissues rendered especially susceptible by post-operative processes of repair.

The **bacillus coli communis** is also a gas producing micro-

organism, and removed from its natural habitat, the large intestine, acquires well-marked pathological properties. This bacillus has been found in the uterus, and in ovarian and tubal suppuration, which location it probably gains by direct contact with some part of the intestinal canal, but it has also been found in the vagina where its presence is more difficult of explanation. It is possible that under favorable culture conditions, the bacillus may find its way from the anus into the genital canal, from whence it is in position to infect the bladder, even the kidneys and the general peritoneal cavity. Though of infrequent occurrence in the vagina, and hence when deeper infection exists it is not usually through this entrance, it is sufficiently pathological when it does appear there to require exclusion and destruction.

The **bacillus tuberculosis** is infrequent in the vagina or vaginal secretion, but this micro-organism has been found in the external genital organs quite independently of any focus of disease or tuberculous centre from above. Knowing the history of this bacillus, that its chief dissemination is by means of dried sputum, it is conceivable that dust containing the bacillus may, by means of the clothing, the examining finger, or instruments, obtain lodgment in the vagina, where, finding soil favorable for growth, it passes upwards to infect the uterus and Fallopian tubes. It is also possible that coitus may be the source of vaginal infection. Tuberculosis of the male organs is not a very rare disease, and through ignorance or carelessness, the essential micro-organism may by means of sexual intercourse be lodged in the vagina.

Before considering the technique of gynæcological asepsis we may refer to the advantages of **oral sepsis,** as a part of the preparation for gynæcic operations.

A not infrequent complication of surgical operations in general, and one that gives the surgeon well-founded anxiety, is **parotitis,** which differs from the ordinary mumps by constant involvement of the cervical lymphatics. Following swelling of the parotid glands this secondary development may be looked upon as evidence of a more general infection, of especial significance when the peritoneum or pelvic cellular tissue are

to be reckoned with. It has been shown that post-operative parotitis is always associated with oral sepsis, carious teeth, and the presence of pathological micro-organisms in the mouth, and the depression of vital forces that follows a gynæcological operation may reasonably be regarded as favorable to bacterial activity, as well as predisposing to deeper and more remote infection.

As a part therefore of **the preparatory treatment for gynæcological operations,** it is advisable to secure asepsis of the mouth and teeth. Carious teeth should receive attention, and the mouth be cleansed frequently with *permanganate-of-potash, boracic acid,* or a weak solution of *peroxide-of-hydrogen.* Sometimes the sepsis is lower in the digestive tract, as shown by fœtid breath. The most satisfactory **intestinal antiseptic and** antiferment with which I am acquainted is the *Carbonate of Guaiacol.* I administer this in capsules of five grains before eating, or every four hours, for several days preceding the operation.

Exactness in the details of aseptic and antiseptic technique should precede and form a part of every gynæcological examination and operation. The findings of modern bacteriology are against spontaneous generation, and the entire agreement of such findings with clinical medicine oppose auto-infection, and admit of no question that pathological micro-organisms found in the vagina, unless derived from some primarily infected focus situated in the upper genito-urinary tract,—a rare happening and generally capable of demonstration,—are always introduced through the *introitus vagina;* and while in addition to the asepsis of the healthy vagina and the provision made for its maintenance, we may assume the existence of a natural inhibitory power of the living cells and fluids of the body, whereby the bacteria and their ptomaines are held in control, the degree to which this protective property is active is so largely individual, and depends upon so many unknown, and therefore incalculable conditions, that we cannot rely upon it in our preparations for gynæcological manipulations, nor can we safely trust to aseptic technique alone to render the field of operation sterile and unfit for the cultivation of micro-organisms.

To asepsis, upon which all modern surgery is built, must be added a technique that insures destruction of the pathological micro-organisms that may have gained access to the genital canal, either before or at the time of the manipulation—antisepsis. Absolute cleanliness is not sufficient. Sterile water will not destroy pathogenic germs; we must render the field of operation sterile, and at the same time avail ourselves of bactericides sufficiently powerful to kill germ life. When we employ such agents we enter the domains of chemistry, which concerns the relation between all living bodies and their surroundings.

The Principles of Antiseptic Gynæcology will take into consideration two propositions: *First*, the inhibition of living cells— **phagocytosis**—and the anti-bacterial properties of the bacillus vaginæ; *second*, the life history of the micro-organisms that are known to be the active agents in septic infection. In carrying out therefore any antiseptic system, success will be measured by the efficiency with which the natural provision against the invasion of pathological micro-organisms is assisted, and the thoroughness with which such micro-organisms are destroyed.

Only the healthy living leucocyte possesses in full measure phagocytic powers, and therefore it may be broadly stated that such properties are not active in the presence of diseases that affect these cells; that leucocytes not well nourished, as in an inherited or acquired vicious metabolism, are not able to maintain their "scavenging" character, or through processes of digestion, determine the type of the disease that shall follow a definite bacterial invasion. To avail ourselves of nature's defensive army we must see to it that the functions of the body are properly performed, and so secure healthy cell life with which to combat morbid organisms. We must first establish and maintain the physiological conditions of the vagina, knowing that in such we possess a powerful aid to asepsis.

The acidity of the healthy vaginal secretion may be regarded as a clear indication that we should preserve an acid reaction of the vagina and avoid the use of chemicals that will render the secretion alkaline. The question of antisep-

tics is at once introduced. All such are chemicals, for they affect germ life in the degree to which they disturb equilibrium between the micro-organisms, and the fluid by which they are surrounded and through which they receive their nourishment.

The keynote of modern surgery is cleanliness, clean hands, clean instruments, clean dressings, and a clean field for operating, are identical with the exclusion of micro-organisms. Save in exceptional instances, as in the presence of molecular necrosis, powerful chemicals are no longer regarded with favor as antiseptics. It is found that they not only kill the pathogenic micro-organisms, but at the same time they destroy living cells and healthy tissues, and in so doing remove physiological barriers against the invasion of disease germs; therefore aseptic cleansing, and the use of a bactericide and antiseptic in solutions that are weak, compared with those that were formerly considered necessary, will best meet the requirements of scientific surgery.

Probably the strength of the solution has less to do with the destruction of the micro-organisms than was at first believed. The bactericidal and antiseptic action of carbolic acid, the various forms of mercury and the like, is dynamic, and quite independent of the strength in which they are exhibited; and while the over-strength may more quickly destroy germ life, the desired action is along certain lines, and success will follow the determining of the strength necessary to accomplish this, and no more.

The preparation for a gynæcological examination, should be conducted with the strictest attention to aseptic detail, for it is more than probable that many cases of pelvic cellulitis originate in infection conveyed during such manipulations. Reference to this may seem unnecessary, but it is to be feared that the letter of the law is frequently broken, because of a not very clear understanding and appreciation of the meaning and importance of its spirit. Every aseptic precaution may be complied with in the preparation of the field of examination, the instruments, and the surgeons hands, but at the last moment we all have seen the examiner adjust his clothing, arrange his beard, or handle some

article that has not been sterilized. The strength of a chain is thus weakened by the forging of one of its links. For the older surgeons who have not enjoyed an early aseptic training, however strongly they may endorse its principles, there is an explanation of this lapse in the application of the key-stone of modern surgery; but for the younger men there is neither explanation nor excuse.

The necessity for making even slight gynæcological examinations aseptic becomes apparent when we consider the lymphatic distribution of the vagina and the uterus, and, also, the not at all remote possibility of an unsuspected existence of some slight abrasion of the mucosa before the examination, or the occurrence of such as its immediate result. I do not doubt that many of the sequelæ of vaginal examinations and minor operations can be traced to infection at the time of the examination. An examination is made for some slight disorder, but contrary to our expectations the treatment applied not only fails to control, but the disease remains stationary, or to it is added a degree of pelvic exudate, or a general condition of depression, that mark septic intoxication. The case, the nature of which may not be suspected, finally recovers, but the uterus remains slightly fixed, as the next surgeon who examines the patient will discover, or chronic invalidism follows. This is not a picture of the imagination, and its truthfulness under many different phases must serve as an incentive to exercise every possible precaution to render even the slightest vaginal examinations strictly aseptic.

All the details of aseptic surgery cannot be carried out in office practice, save as they apply to the surgeon and his instruments; for though directions for home douching may be given, in few matters are women less exact than in the details and the recording of such preparations. I therefore always feel some hesitation in making the first vaginal examination in my office, especially if it is necessary to include the use of the uterine sound; and while I do not recall any of the untoward results of which we have spoken following such examinations, I cannot but recognize the inherent possibilities.

Immediately before an examination in my office my nurse

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gives a carbolic acid douche, and after the speculum is in place I use a compressed air spray of peroxide of hydrogen.

When the examination is domiciliary, a nurse should if possible make the preparations, the pubes and vulva should be thoroughly cleansed with green soap, the latter being allowed to remain in contact with the parts for twenty minutes. This should then be washed off with cotton sponges, never with a hard brush. Half an hour before the examination a carbolic acid douche is given, followed by one of a weak solution of acetic acid—one drachm in a pint of water. If cervical, or vaginal catarrh are present, it is well to repeat the acidulated douche immediately before the examination to insure against auto-infection, should the mucosa become torn during the manipulation.

The Examiner's hands deserve the next attention, and are of more importance than the preparation of the vagina. Rubber gloves or finger tips are unnecessary, save as means for self-protection. In the presence of specific disease of the patient, or an abrasion of the surgeon's hand, rubber gloves or fingers are useful, otherwise they may be dispensed with.

The gynæcologist's hands, especially his nails, should be kept well groomed. The nails cut as short as possible, and the tissues surrounding them pressed back so that they can be easily cleaned with the brush and nail cleaner. For routine purposes thorough scrubbing with hot water and green soap, followed by rinsing with alcohol, will render the hands aseptic for an examination, but it would be futile to proceed even thus far, and then use the family vaseline for the fingers and the instruments. If sterilized vaseline is not at hand—it should always be in the surgeon's instrument bag—green soap offers a good emollient.

A word here in relation to **the use of the uterine sound for examination of the uterus.** Without a speculum its use cannot be too strongly condemned. The frequent practice of passing the sound into the uterus with the finger of the other hand already in the vagina as a guide, is unsafe and slovenly. Should pathologic organisms remain in the vagina they would be conveyed into the uterus together with the sound, and the sur-

geon's finger, if in any way contaminated before introduction, might well prove a source of infection to the sound passing over it. The only safe method of introducing a sound into the uterus is through a speculum, and with the os in full view. Then it is not necessary for the instrument to touch any tissues until it engages in the uterine os.

The preparations for a gynæcological operation will be more elaborate, inasmuch as the proposition involves solution of tissue continuity, with corresponding opportunities for lymphatic and cellular tissue absorption, and consequent removal of nature's barriers against the growth and multiplication of pathological micro-organisms.

But the preparation will include more than measures directed to rendering the field of operation aseptic. The general system will require to be looked after, and the normal equilibrium between waste and repair established. The eliminating organs, provided to remove the products of metabolism that are useless to man, must be stimulated to increased activity, and thus the organism brought in the best possible condition to meet the demands made upon it; and natural phagocytosis encouraged.

Beginning several days before the operation, the patient is to be encouraged to drink freely of pure spring water. The kidneys are thus washed out, and the urinary solids diluted. A very frequent cause of post-operative complications is a highly concentrated urine with imperfect elimination of urea. The liver and bowels should receive attention. Nothing meets this indication better than *Merc. dulc.* A powder of five or ten grains of the *1st x* trituration, administered for several successive nights preceding the operation, will act upon the liver and stimulate the intestinal function.

I do not favor the strict dieting of patients for any length of time before an operation. The food to which they have been accustomed will nourish best, and be the most acceptable to the patient. Moreover, the constant reminder of the coming ordeal furnished by specially prepared meals will, with some patients give rise to an unfavorable mental depression. For twelve hours before the operation I exclude all farinaceous

food and milk, seeking to over-nourish, but at the same time to avoid articles that leave unnecessary residue in the intestinal tract. This regimen will be largely made up of meats, broths and the white of eggs. Milk should not be used before abdominal operations. It constipates, and with some patients, especially those inclined to neurasthenia, I have found that it favors torpidity of the liver, and the constipation that frequently embarrasses convalescence.

I am convinced that **little we can do in the way of diet before the operation influences ether nausea,** but I am inclined to think that patients suffer less and recover more quickly from this distressing symptom when they go to the operating table with something in the stomach, and not with it entirely empty. This need not be food, for the process of digestion would be arrested, and its presence unnecessarily tax the system, but water serves the dual purpose of a diluent of the anæsthetic, and matter upon which the stomach can contract. I therefore have my patient drink a pint of hot water a short time before the operation, and I think that since adopting this practice the nausea and vomiting have not been as severe and long lasting, as when brought to the operating table with an empty stomach.

For the reason that we cannot with certainty before an operation say the exact extent of our manipulations, **it is always well to have both vagina and abdomen prepared** in case it should become necessary to utilize both sites to complete our work. This may seem an unnecessary precaution when the operation is a simple repair of the lacerated cervix, but we may find it necessary to open the abdomen and remove a diseased ovary and tube, not made out until the anæsthesia offered increased facilities for diagnosis, when the original intention was to repair the cervix only. I always therefore adopt the precautionary measure of complete preparation for any operation involving the vagina or uterus, no matter how trivial it may appear to be.

Twenty-four hours before the operation the pubes is shaved, and the labia, vulva, groins and abdomen carefully washed with German green soap, not the tincture. Some women will

object to shaving, but this should be insisted upon, and few will resist if the necessity of the measure is explained. It is sometimes well to refer to this in the presence of the patient when giving directions to the nurse.

The vagina should then be cleansed with green soap, and subsequently irrigated with carbolic acid solution. At each step of the preparation the utmost care must be exercised not to abrade the skin or mucous membrane, therefore a brush is not to be used, but all friction and drying accomplished by means of cotton sponges. In private practice it is rarely necessary to cover the abdomen with a soap poultice, but the condition of the integument may render it well to do so. I prefer a large compress saturated with boracic acid on the abdomen, and a carbolic acid compress over the vulva. Boracic acid softens the epithelial covering, and prepares it for the stronger antiseptic dressing that is to follow.

The morning of the operation the process of cleansing is to be repeated, and a bichloride compress substituted for the boracic acid. The vaginal douche will also be bichloride, $\frac{1}{1000}$. The final cleansing, which takes place on the operating table, is the same, making three soap cleansings, but followed on the external parts with, *first*, ether; *second*, alcohol, and in the vagina with a thorough application of acidulated alcohol.

One of the most powerful antiseptics we possess is alcohol, which not only affects the superficial structures, but penetrates the deeper layers of the skin to a degree not belonging to any other substance. **The bactericidal properties of alcohol are markedly augmented by the addition of acetic acid** in the proportion of one drachm in an ounce of alcohol. This preparation has the further advantage of drying the tissues to such a degree as to render them unfit soil for the development of micro-organisms.

Referring to natural vaginal asepsis, which coexists with acidity of the vaginal secretion and the presence of the vaginal bacillus, and ceases to exist in proportion as the secretion becomes alkaline, we find in **acidulated alcohol a vaginal bactericide of great value.** Since using it in vaginal operations I have not had a pus case that could be attributed to faulty technique. Because

of the irritating qualities of alcohol, its use in the vagina must
be confined to the final cleansing on the operating table im-
mediately before the operation, but as the last step in asepsis
of the vagina I place the utmost confidence in its use in com-
bination with acetic acid.

After carefully drying the vagina—and here again, at the
risk of a merited charge of repetition, I would caution against
unnecessary roughness and too much vigor—the canal is
swabbed out thoroughly with acidulated alcohol in the propor-
tion mentioned, and, if need be, a speculum used to make the
application more directly to the vault of the vagina and the cer-
vix uteri.   This is, however, in the majority of cases unneces-
sary.

The dressing of the patient for a vaginal operation.—Not all parts
that may be brought in contact with the operator's hands,
instruments and dressings, can be prepared with equal care,
and if the draping is done with towels these are liable to be-
come misplaced or deranged and parts not strictly aseptic ex-
posed.   It is, therefore, best to use linen drawers with feet,
made to cover the thighs, and reaching to the waist line about
which they are fastened with a string.

**The preparation of the operator and all those who take part in the
manipulation.**—Not only the hands that come in contact with the
field of operation, instruments and dressings, but the person
must, as far as possible, be rendered surgically clean.   That is
to say, hair, beard, and mouth, for oral sepsis cannot fail to
introduce an element of danger, especially when the abdomen
is opened and the breath of the operator forced into the ab-
dominal cavity, should be subjected to rigid cleansing.

A suit of trousers and coat is preferable to a gown.   The
operator is freer, especially if he sits, and is better protected
when he removes all but his underclothing.   The coat should
be made with comfortably tight sleeves, gathered above the
elbow with a string.   We thus avoid soiled sleeves, which would
become sources of possible infection, and if the arms are pre-
pared with the same aseptic care as the hands, no danger will
attend contact with them.

Consistency suggests the use of an operating cap, but prac-

tically I do not know that any danger is thus eliminated. Very few surgeons are clean shaven, and unless the beard is covered, a rather difficult detail to perfect, the skull-cap or turban does not exclude possible danger from this source. More practical results will be obtained by thorough cleansing, and the antiseptic treatment of both head and beard before the operation.

The Operator's Hands.—Rubber gloves I regard as an unnecessary addition to the surgeon's armamentarium. It is true, they can be made aseptic, and under some conditions, injury of the operator's hands, or rapidly passing from one operation to another, especially if a case is open to the suspicion of being dirty, their use is to be advocated, but in ordinary private work I find little to commend them. It matters not how well accustomed one may become to their use, the tactile sense must to a certain degree suffer. In all surgical work delicacy of touch and nicety of manipulation count for much, and these cannot be perfect with even a thin rubber tissue between the finger and the operative field. The danger of pricking or cutting the glove, which is sometimes urged against their use, need not enter into the *pros* and *cons*, for the bungler will always meet with such accidents, and it is not the province of surgery to provide for poor mechanics. My sole objection to the use of gloves is based upon the fact, that the same dexterity cannot be exercised with them as when the hands are bare.

The reflection of the skin about the nails is justly regarded as a chief source of danger in the hands. The sulci there formed offer protection for any variety of micro-organisms, and are difficult to cleanse. Another source of danger is the perspiration of the hands, which is known to nourish a white staphylococcus.

The method of hand preparation that I follow, is: *1st*. The hands and arms are immersed in very hot water for ten minutes. This process thoroughly opens the pores of the skin and the sulci about the nails, rendering the reflected epithelium soft, and dissolving any material that may have collected there holding micro-organisms. *2d*. The nails are cleansed with nail cleaners, the cleaner dipping into every depression where foreign

material could collect. *3d*. The nails, hands and arms are thoroughly scrubbed with green soap. *4th*. This is rinsed off, and the hands and arms washed with chloride of lime and soda. This should be well rubbed in, the process occupying at least five minutes. For five minutes longer the paste made by the lime and soda is allowed to remain on the skin. *5th*. The hands and arms are rinsed in sterile water, and the operating coat put on. The hands and arms are then wrapped in a towel, which is not removed until the operation. *6th*. Immediately before beginning the operation warm alcohol is poured over the hands and arms and allowed to evaporate. I exact the same detail of preparation for my assistants and nurses that I have laid down for the operator.

The operative technique, that is characterized by simplicity as well as by an absence of unnecessary manipulations, will be attended with the best results. Unfortunately it is frequently impossible before an operation for the surgeon to say either the exact extent or the nature of his work, but as far as this can be done it should form the basis of procedure, thus avoiding change of plan and consequent indefiniteness of purpose, with loss of time and unnecessary manipulation. Training that leads to rapid and exact mental action, is essential to any one who undertakes the responsibilities of an operation. In other words, the surgeon must be possessed of that degree of culture which enables him to concentrate all his knowledge and all his experience within a single moment, and upon a single act of decision.

The number of hands immediately concerned in an operation are in direct ratio to sepsis, and danger of infection. Therefore, and because it saves time, I prefer to handle my own instruments. I can more safely and quickly select the required instrument from a conveniently placed table, than I can request an assistant to do it for me. The instruments are placed with a definite arrangement at my right hand, so that I can reach them almost without looking at them; thus only my own hands, of which I am reasonably certain, come in contact with the field of operation. Needles are introduced, and ligatures tied without assistance.

My examinations during the operation are as infrequent as possible; I endeavor to ascertain at the first introduction of the fingers the conditions to be overcome, and plan the method by which I will overcome them. The instruments as quickly as soiled, are rinsed by the operating nurse, who devotes herself exclusively to this function, never touching anything else in the room.

Every one in any way associated with the operation should confine himself to his especial work, and under no circumstances, it matters not what emergency may arise, assume a position that does not belong to him and has not been assigned to him. The unexpected in a surgical operation is unavoidable; the unprepared for should never be charged against a surgeon, and it is his duty to plan his work and his assistants' with the same exactness that a general plans his campaign, and to hold each one under him accountable for the proper performance of his especial assignment. It is not unusual in the presence of accidents to see assistants leave their proper position to assist where they do not belong, or for bystanders to hand an instrument, or touch the field of operation. Such procedures cannot be too severely condemned. It is perfectly unnecessary with proper preparation, and must introduce elements of danger, and give rise to confusion in the operating room, that should not exist.

While every instrument that may be called for should be in readiness, no useless instruments should be on the table, and it may be said the more skilful an operator becomes the fewer and simpler are the instruments he uses. The operator of experience will know the speculum that affords him the best exposure, and does not cumber his stand with several different forms. A few familiar instruments in the hands of the expert can accomplish as much as, and more than, a multitude in the hands of one who does not understand their use.

As far as possible all gynæcological operations should be dry, *first*, because irrigation establishes conditions favorable to microorganic life, and the absorption of toxines, and *second*, because the irrigating fluid obscures the field of operation. I therefore use dry cotton sponges, or folds of gauze in all my opera-

tive work, and have recently adopted the practice of having them rinsed in water slightly acidulated with alcohol and acetic acid before using a second time. Sometimes when rapid sponging is necessary, sponges are laid on the towel covering the abdomen, ready for immediate use. This should not be done. If the nurse who has charge of this part of the operation is attentive to her duties she will be able to supply the sponges as rapidly as they are required.

Drainage is generally necessary in vaginal operations.—That the vagina is an open tube is not sufficient, or that it is naturally aseptic. The operation changes both of these conditions. Swelling of the vaginal mucosa with consequent formation of sulci furnish sites for the arrest and development of microorganisms, and the normal secretion of the vagina, if not altered by the conditions that make the operation necessary, is changed by the operation itself. It is also desirable to leave the vagina as dry as possible, to arrest all oozing and remove all clots of blood.

If it has been found necessary to irrigate, the parts should be gently sponged until perfectly dry. This cannot be accomplished while the speculum is in position, for fluid will gravitate to the depression made by it in the posterior cul-de-sac. Therefore, the speculum should be removed, and the vulva separated with the fingers, between which the sponge is introduced into the vagina. After the vagina is dried, I sponge with acidulated alcohol and then introduce a light gauze packing. This may be Iodoform, or simple sterilized gauze. The former is to be prefered from the fact that it resists the changes of decomposition longer than plain gauze, but it should never be used stronger than a five per cent. saturation. Especially is Iodoform gauze to be recommended in operations involving the cervical or corporal mucosa when oozing is inevitable ; and while I am not prepared to say that Iodoform actually influences the course of the healing, it is certain that the first dressing and discharge are less offensive when it is used.

Heavy vulvar dressings are to be avoided ; they add unnecessary discomfort to the patient, prevent free discharge and increase local heat. The lightest gauze pad, not cotton or combined

dressing, consistent with surgical neatness and cleanliness, is all that is required. This will be changed frequently. The same directions apply to the dressings for the abdominal wound, save that to the latter adhesive straps and the abdominal binder are added.

The post-operative treatment of gynæcological cases.—Unless in the presence of shock, the first condition to claim attention will be ether nausea. I have already spoken of the use of water before the operation to control this, but it may require more active treatment. Simple vomiting calls for little attention. It is quite physiological and will soon cease. Continued empty retching, or vomit tinged with bile should be treated by washing out the stomach—this may be done before the patient leaves the operating table—with bicarbonate of soda and warm water, in the proportion of a drachm to half a pint of warm water. The patient may drink this after each attack of emesis. It cleanses the stomach and affords it rest for a short time. If there is reason to anticipate troublesome gastric irritability, *bromide of soda*, thirty grains in two ounces of water, may be injected into the rectum immediately after the operation. I have known this to apparently control nausea when experience derived from previous operations, made its occurrence almost certain. A small hypodermic of *Morphine*, one-eighth grain, will frequently quiet gastric hyperæsthesia. *Chloroform water* or a counter irritant placed over the hypogastrium are to be thought of.

From remedies indicated by their provings I have derived little benefit in the treatment of post-operative nausea and vomiting, with possibly the exception of *Capsicum*, which I administer in the tincture, six drops in two ounces of water, a spoonful every half hour. In general, the continuance of vomiting beyond the elimination of the anæsthetic—about twenty-four hours—depends upon other conditions, that will demand attention. All food should then be withheld from the mouth, and the patient sustained by enemas. Unless the continued emesis is due to the patient's idiosyncrasy, and we occasionally meet with such instances, we are most probably now dealing with peritonitis, or intestinal obstruction, both of

which complications and their treatment will be discussed under *the complications of gynæcological operations, page 80.*

Ice water, or cracked ice, should never be allowed after abdominal operations. They allay thirst only temporarily; the secondary action is to dry the mucous membrane of the mouth, and by chilling the stomach, arrest its activity.

Further post-operative treatment will best be in the direction of establishing such systemic conditions as oppose the development of micro-organisms, and the absorption of their toxines. To this end all the eliminating organs should be functionally encouraged. During the post-operative period of quiescence, when the entire system is resting, and locally there is an arrest of constructive metabolism, inaction may safely be permitted or even encouraged, but after that period it is well to assist nature and direct our attention to the intestines and kidneys, seeing to it that they perform their function normally and freely. It may be that a simple enema will be sufficient to restore intestinal activity. Frequently it is only necessary to clear the rectum and lower bowel to induce free evacuations, but if this is not followed by satisfactory results the inactivity should be attacked from above. I find nothing better than *Sulph. mag.,* either in a single dose or in divided doses of a saturated solution, preceded two hours before administration, by *Merc. dulc.,* or a grain of *Calomel* and soda. Seidlitz powders are liable to cause flatulence, and are not always efficient. Occasionally some form of *Cascara* will answer the purpose. *Podophyllum* in ¼ grain doses is also useful. *Citrate of magnesia, Rubinat water* or any gentle cathartic that the patient's experience, which it is always well to consult, may suggest. Efforts at inducing intestinal activity should not be relaxed until attended with success, for there is always an element of uncertainty as to the outcome of any operation involving the pelvic and abdominal organs, or the peritoneum, until the intestines are known to have resumed their function.

Drinking freely of water after an operation is to be encouraged.—It relieves ether nausea, and assists in establishing the functional activity of the kidneys and intestines. For the first twenty-

four or forty-eight hours, nothing more need be insisted upon. The digestive organs, unless to satisfy a distinct craving, or indication, may be allowed to rest. After that, by gradually increasing from liquid food to solids, within a week a full light diet may be reached.

I always allow my patient to void her urine as soon as possible, this sometimes cannot be done until after the vaginal packing has been removed. The retention is mechanical. If the trouble continues, a few doses of *Arnica*, *Arsenicum*, or *Sepia*, will usually be all that is necessary to establish the natural empty-ing of the bladder. Until this is established the patient should be catheterized every eight hours.

It is not unusual after vaginal or uterine operations for **Cystitis** to develop. In some instances it becomes most distressing, constituting the chief suffering. For this com-plication of convalescence the nurse is not always respon-sible on the ground of negligence in the care of her catheter or its use. In some instances it may be due to direct infection of the urethra at the time of the operation, but many times I have been convinced that it has its origin in violence done to the inferior hypograstric plexus of nerves, and is not a true cystitis, but rather a neurosis that expends itself on the bladder and urethra. The urine is loaded with phosphates, but rarely contains pus or any constituents that would indicate the pres-ence of inflammation. Such a clinical history marks the early stages of this form of post-operative dysuria. Later there may develop a true cystitis or urethritis, grafted by infection upon the neurosis.

Treatment of cystitis.—If the strangury is a neurosis, and I look upon the majority of post-operative cases of painful urination as such, the remedies from which I derived the most benefit are *Belladonna* and *Hypericum*. These admin-istered as soon as the trouble becomes manifest will assist in reducing the hyperæsthesia and in overcoming the effect of trauma. Other internal medication failing to relieve, I have sometimes obtained satisfactory results from *Bromide of soda* in doses of ten grains repeated every four hours. Locally, much benefit will be derived from the application of *Nitrate*

of silver in the strength of one grain in an ounce of sterile water. This remedy exercises a most soothing effect upon the terminal nerves of the bladder and urethra, and at the same time reduces the hyperæmia that results from nervous irritation. This strength of the drug produces no other than a sedative action.

If true Cystitis, that is, the infectious form develops, we must prepare ourselves and the patient for a more or less delayed convalescence ; recovery from the operation will take place before the bladder is well. We can accomplish nothing without the strictest attention to asepsis, for in rendering the bladder absolutely antiseptic lies our chief hope of effecting a cure. Internal remedies will do little as long as micro-organisms, or a pathological condition of the urine exist. The former must be destroyed, the latter must be rendered bland and of normal composition.

The choice of antiseptic to be injected into the bladder is of the utmost importance. Strong chemicals do more harm than good, for while they may accomplish the destruction of the bacilli, they have an injurious effect upon the mucous lining of the bladder. My choice falls between daily irrigations with *Permanganate of potash,* five grains in a pint of sterilized water ; *Argyrol,* $\frac{1}{3000}$, or *Nitrate of silver,* $\frac{1}{1000}$, maintaining meanwhile a bland condition of the urine by the administration of some alkaline water, or, preferably, the *Citrate of potash.*

Frequently post-operative Cystitis is stimulated and sometimes induced by **the gouty diathesis.** This origin will be determined by urinalysis, and a plan of treatment adopted in accordance with the finding. Uric acid solvents will be necessary. *Pyperazine,* twenty-four grains well diluted in water, taken in twenty-four hours ; or *Asperin,* in five grain capsules, taken before eating, and the elimination of nitrogenous food from the diet, will aid in removing the chemically irritating qualities from the urine.

We will of course always seek to administer the dynamic remedy. Such will be found in *Turpentine, Cantharides, Cubebs, Iris, Petroselinum,* and many others whose pathogenesis furnishes a picture of the disease we are prescribing for

Thus far we have considered only the straight-going gynæco-
logical operations, save as we have spoken of the bladder in-
volvement, but before discussing the more complicated cases
and those that follow a stormy convalescence, I desire to refer
to the moot question of the use of Morphine, or any opiate
after gynæcological operations.

Objections to **the use of Morphine after abdominal operations** are
urged principally upon the ground that it masks the true con-
dition, induces intestinal paresis and arrests all secretions.
These allegations deserve consideration, for they are well
founded, and touching as they do the most vital points con-
cerning the after treatment and course of gynæcological
operations, must be discussed without prejudice. But like all
facts when viewed from a single position and without correla-
tion, this one of the use of Morphine is liable to distortion.

After an operation we seek to maintain mental and physical rest until
the system in general, and the parts mutilated shall have time
to recover from the shock that has been inflicted. Our object
is to establish conditions in which there is a minimum degree of
waste, and our treatment is in a line with the clear indications
of nature to withhold our hand from interference with the
pause that she would establish after shock.

Some patients while recovering from an anæsthetic and from
an operation, show an unusual intolerance of suffering, are
noisy, restless and apprehensive. They cry out, will not lie
quietly, and fret themselves with fears for the future. Such con-
ditions cannot fail to act to their disadvantage, and the energy
thus expended should be conserved. To me this nervous state
is an indication of the degree of shock, and as such, merits
treatment. All patients are not so affected, but when they are,
should be quieted.

Because of its power to arrest function, mental and physical,
**Morphine occupies a high therapeutic position in the treatment of condi-
tions immediately following operations,** and administered in doses
sufficient to insure rest, and continued only until that object
has been obtained, can produce no deleterious effect or action
that is not transitory and easily overcome. The proposition
that presents itself for our consideration, is a degree of

unrest that is likely to act harmfully on the one hand, and a very remote possibility of a drug effect, which in its nature is temporary, on the other.   I consider it far wiser, and more in accordance with medical progress, to risk the latter, for the certainty of averting the former state.

The necessary dose of morphine after an operation is usually very small.   One-eighth of a grain after an anæsthetic is equal in effect to double that quantity at another time, or under other conditions, and usually does not require to be repeated if administered before the patient recovers from the anæsthetic. If we delay until there is full consciousness of suffering, mental or physical, a larger dose is required.   Even if we find that we must repeat the dose, the alleged deleterious action is scarcely to be reckoned with.   For the first night following the operation, or, possibly for the first twenty-four hours, the patient should have rest.   To this end I administer Morphine when necessary, in the manner indicated, and I have seen none but beneficial results follow its use.

The complications of gynæcological operations, as of operations in general, are along the lines of septic poisoning, and the gynæcological surgeon who fixes this firmly in his mind, who looks upon retarded convalescence, departure from normal progress towards recovery, the development of obscure symptoms and, above all, continued variations of pulse and temperature as due to micro-organisms, and does not try to deceive himself against his own judgment, but recognizes the hydra-headed monster and grapples with it upon the recognition of its presence, will treat his cases according to scientific principles, and with the measure of success that should follow such treatment.   The bacteria of septicæmia having already been referred to, our attention will here be directed to the clinical picture and its treatment.

Septicæmia, and for convenience, under this head, I include all the septic diseases arising from the toxines generated by micro-organisms, may be one of the most clearly defined and easily demonstrated conditions, or one of the most obscure and insidious after effects of gynæcological surgery.

To the abdominal surgeon of experience there is rarely much

difficulty in recognizing the earliest stages of septic intoxication. The general condition of the patient is not satisfactory. There is either more or less reaction from the operation than one expects. The patient progresses too rapidly for the first two or three days, indicating an absence of that normal sensibility of the nervous system which should respond to the shock of an operation, and which is naturally manifested by depression. This state is frequently most deceptive, and unless prepared for may lead the surgeon astray by causing him to relax his watchful attention. The appetite is too keen, the mind too active, and the general state almost one of excitement. But a closer examination will show a discrepancy between the apparent well-being and the actual physical and mental condition. The tongue is dry and red, ether dryness continuing beyond the usual twenty-four hours. The skin is dry, the patient has not been bathed in the physiological eliminative perspiration that the surgeon welcomes as the ether stage passes off. All the eliminative organs are inactive. The kidneys secrete scantily, the urine being of low specific gravity and loaded with the products of imperfect metabolism. The intestinal canal does not act, nor does it respond to ordinary cathartics. Enemas clear the lower bowels, but induce no higher action. Flatus is passed, *but it is without fecal odor.* The skin is rather yellow than pale, and the conjunctiva muddy looking.

A study of the pulse and temperature is suggestive as a part of the general toxic picture. The most significant feature is the absence of rhythm, and an unaccountable variableness. The temperature chart will show a change of one or two degrees in as many hours, and the pulse seems to vary with every reading, no matter how frequently taken. The patient expresses herself as feeling well, but this condition will not continue long without further developments, and is one that should at once arrest the attention of the surgeon and cause him to establish without delay such physiological activity as will enable the system to cast off the toxines that clearly possess it. Upon the prompt accomplishment of this line of treatment will depend the success or failure of our efforts.

Septic intoxication is not always ushered in with such gradual

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and uncertain steps, but may develop with unmistakable phe-
nomena a few hours after the operation. In some instances
the onset is so rapid that no doubt exists but that the ptomaines
were introduced at the time of and with the operation, without
the presence of either pus or the essential micro-organism.
Some of the most violently rapid cases of septicæmia run their
course without pus or any evidence of suppuration. Such cases
may simulate surgical shock, or shock from secondary hemor-
rhage, so much do they seem to be a part of the operation, but
a comparison of the clinical features peculiar to each of these
states will establish the diagnosis.

In what may be designated **operative septicæmia,** that form
which develops rapidly upon the operation, the anæsthetic
pulse, which we usually expect will change to the rhythm of
reaction in a few hours, continues, becoming more rapid, thin
and irregular. The temperature may remain sub-normal or
rise rapidly, falling as rapidly to rise again above the previous
reading, this fluctuation being repeated until the fatal termina-
tion. Rarely will two records of pulse and temperature cor-
respond.

Vomiting continues, unaccompanied with nausea. At first it
is only spitting up of saliva, but later becomes a copious re-
gurgitation of fluid, frequently stained with bile, and offensive
even before it becomes fecal, which it is certain to do should
the patient survive long enough. One may well question
where the enormous quantity of fluid comes from that is ejected
from the stomach, it being greatly in excess of that taken into
the system. Delirium, in the form of mental aberrations is an
early symptom and seems to be almost a continuation of the
mental disturbance of the anæsthetic. All secretions are
arrested, and the general condition is one of most profound
depression. Stimulants are unavailing, the heart responds
to no treatment, and the patient succumbs in twenty-four to
thirty-six hours.

The depression of **surgical shock,** with its thin, wiry pulse, sub-
normal temperature, and complete arrest of functional activity,
may at first give rise to the suspicion of acute septic intoxica-
tion—for there is nothing to support a belief in secondary

shock, the condition that has been so named being due to septic poisoning, or secondary hemorrhage—but our diagnosis will be established upon: *1st.* The state is a direct continuation of the operation, no interval being observed between the conclusion of one and the beginning of the other. *2d.* Upon the fact that shock is characterized by the most profound mental and physical depression. The mind is perfectly clear, but inactive. The patient is interested in nothing. Her danger is neither realized nor a cause for speculation. She is indifferent to all her surroundings. Her skin is cold and clammy, she lies motionless, and is apathetic to her environment.

Shock from hemorrhage presents two aspects for differentiation: *1st.* That which is continuous with the operation has its origin in the known loss of blood during surgical manipulation, and, therefore presents no difficulty in its diagnosis. *2d.* Shock from secondary hemorrhage presents some symptoms of similarity to septic intoxication. There is the same rapid pulse, but it is soft, rather than hard. The temperature is sub-normal, the surface cold and clammy, but with this there is great restlessness and mental anxiety. The patient is apprehensive and fearful. The mind is active, and occupies itself with questions and suggestions. Not unfrequently there is intense physical suffering, the pains following the course of the large nerve trunks. This state may be characterized as one of hyperæsthesia, due to a sudden withdrawal of nourishment.

The Treatment of Septicæmia.—I place little reliance upon drugs alone. When we remember the lethal forces with which we are doing battle; the rapidity, when once they have possessed the system with which the poisons are disseminated, we will recognize the necessity of availing ourselves, not only of the dynamic power of drugs, but, also of our obligation to assist by all means in our power, chemical and mechanical, functional activity. The lungs, heart, kidneys, liver and intestines must be assisted, and assisted by such means as tax their own and inherent powers of activity to a minimum degree. We will, in other words, sustain organic function, maintain activity by setting in operation forces that act upon, rather than cause to act, certain organs, the processes of which are essential to well being.

We will first endeavor to sustain the system by stimulating and concentrated nourishment, predigested food if possible. Nothing in my experience serves this purpose as well as beef juice and raw eggs, either alone or with whiskey. Peptonized milk, and Panopeptone, are also to be thought of. We cannot get along without *alcohol in the treatment of septicæmia.* It should be given freely, not only as a stimulant, but to arrest waste and conserve energy. I give it freely in any form that is agreeable to the patient.

Plenty of fresh air, with possibly artificial oxygen to induce super-oxidation of the blood, a condition opposed to the development of all micro-organisms and toxines. Frequent baths to favor dermal elimination. The system should be flushed with water. This may be accomplished through the stomach if not too irritable, or through the intestines by means of enemas. For the former, any pure spring water will answer the purpose, or, if it is desired at the same time to stimulate the kidneys, *Vichy Celestines* may be used. The large intestine should be flushed with normal salt solution at least each night and morning, and the patient encouraged to retain as much of the irrigating fluid as possible.

The liver is torpid in almost all toxic conditions, and it will be remembered that bile possesses antiseptic properties in a very marked degree. It is also a powerful bactericide. For the purpose of stimulating this function, *Mercury* in some form must receive the preference, and upon the ground of accurate diagnosis, which should always precede a prescription, we may reasonably expect from its exhibition farther reaching effects than upon this line alone. It is my practice to give Mercury in the form of *Calomel* $\frac{1}{10}$ grain, *Soda 1* grain, until I am satisfied that the liver is functionally active. Sometimes from the urgency of the case—it will be remembered that we are now speaking of incipient septic intoxication—it is best to begin with a large dose of calomel, followed by a saline; after this, the action can be gently maintained, if necessary, by the smaller doses first mentioned. Until the intestinal canal is functionally active, I prefer to administer some saline, preferably *Epsom salts*, or *Phosphate of Soda*, every morning; but after

the first demonstration of activity this is generally unnecessary, for active catharsis is undesirable in view of intestinal irrigation and rectal nourishment.

Of all the organs involved in septicæmia that require assistance in combating the toxines, **the heart demands the most careful attention.** It is the first to show signs of weakness, and upon its strength rests the ability of the system to recover itself from ptomaine intoxication. Therefore, and because we are dealing with an organ that has no period in which to pause for the recovery of its lost energy, we must exercise the utmost caution in the use of means to maintain the heart's activity.

The remedies that we will apply to the heart are few, but their use requires careful differentiation. *Digitalis*, *Strychnine*, *Amyl nit.*, *Nitro glyc.* are the ones principally suggested. The practice is to be condemned of administering heart stimulants or tonics as part of an expectant plan of treatment. On the other hand, upon the first indication of heart weakness, and here I would say that irregularity of rhythm marks a graver condition than regular rapidity, no time should be lost in beginning the treatment. Usually *Strychnine* will meet the first indication. The rapid irregular heart of the early stages of septic intoxication, when the sympathetic system is largely responsible finds its remedy in strychnine ; later when the arterial tension is reduced, showing failure of the actual cardiac structure, *Digitalis* may be substituted. But no class of remedies is more uncertain, and none require more cautious use, than those that affect the heart. Especially is this true of digitalis, the action of which is dangerously accumulative. In general, the system is much more tolerant of strychnine than digitalis, large and repeated doses of the former being borne without deleterious effects. With digitalis the condition is reversed, and I am inclined to the belief that some cases of heart failure complicating septicæmia may be attributed to over zeal in its administration. Constant intelligent watching is the safeguard. It is best to lay down no rule for the nurse to follow in the administration of digitalis, but to let its repetition depend upon the action of the previous dose.

In the early stages of septic intoxication, or when toxemia is sus-

pected, I place great confidence in *Veratrum viride*. Its action upon the heart is in the line of the conservation of energy, reducing over distension, a dangerous result of increased activity, and one that almost always accompanies toxemia. *Arnica*, *Rhus tox.*, *Echinacea* and *Arsenicum* may be studied with profit at this stage.

If in twenty-four hours after the inception of the initial symptoms of septic intoxication there is no improvement, and this improvement will show itself in reduced pulse rate, intestinal and kidney activity, refreshing sleep and a general well being, we may conclude that the poison has full possession of the system, and that we have to combat a very possibly lethal condition. Unassisted, and sometimes with our best efforts, the pulse increases in frequency, and this, because it indicates beginning failure of the heart, is the most significant symptom of danger. The temperature gradually creeps up, the tongue becomes dry, with typhoid coating, indicating the arrest of metabolism. Respiration increases, the intestines show no signs of activity and refuse to respond to enemas or cathartics. The kidneys secrete scantily, or not at all, and the urine contains evidences of interstitial destruction. The stomach can retain nothing. Sometimes the matter taken is not ejected at once, but it is never retained for any length of time. The patient complains of nothing definite, but there is a characteristic mental and physical unrest that does not permit her to remain quiet. In most cases there is no actual pain, and the patient when questioned is not able to locate the suffering. She feels "badly." The abdomen becomes distended, interfering with respiration. The involuntary muscles become paralyzed, the urine and enemas passing without the knowledge of the patient. The body is cold and clammy, and the finger nails blue, but the patient says she is burning up, and calls for air—"air hunger,"—insisting upon being uncovered, upon having her feet out of bed, and being constantly fed with ice. The sense of heat is frequently the only cause of complaint, with this the temperature may be subnormal.

The mind soon sympathizes with the general destructive process. At first a momentary loss of memory, of persons, or

events. The identity of the nurse is lost, the hour of day is mistaken, absent friends are thought to be present. This mental aberration usually begins at night, the patient's mind remaining clear during the day. The condition rapidly increases, the mind becoming permanently clouded; or in other instances, noisy and violent delirium develop. The hebetude deepens until death closes the tragedy.

Unless the toxemia is of an unusually severe character and degree, the patient does not succumb to the intoxication under five or seven days. The process is a certain one. Step by step, and with irresistible force the organs essential to life are involved, and unless the process of destruction is arrested in the initial stages there is little hope of restoring them to their normal functional activity. In this respect septicæmia differs from other poisonings. For them we possess antidotes, the application of which offer a reasonable prospect, not only of eradicating the poison, but of restoring organic health. In time we may be acquainted with such for septicæmia, but at present we possess none such. Great hopes were centered upon serum therapy, but clinically its application has thus far been disappointing.

The treatment of well-developed septicæmia will include all that has been said concerning the incipient stages, and more. If pus is present, it must be given free vent with ample provision for drainage, but it will be remembered that septicæmia and suppuration are not of necessity coincident, and that the most fatal forms of septic poisoning may be present with little or no pus formation. Therefore, in outlining our treatment we must not allow the probability of a pus focus to weigh too heavily in favor of an operation. Unless we have positive evidence of the presence of pus, and can locate it, operative procedures are of questionable utility.

This position is not inconsistent with what may be regarded as the proper treatment of septic peritonitis, in which there are almost always one or more pus foci, prompt opening of the abdomen with thorough irrigation and drainage. In some instances it is well to establish continuous irrigation, for the peritoneal serum contains septic ptomaines, which must be

removed, or in any event diluted. Moreover, by introducing fluid into the peritoneal cavity, its functional activity is encouraged, thereby healthy action promoted, and at the same time a sterile fluid introduced into the system, of which it stands in much need.

Septicæmia uncomplicated with peritonitis, save possibly a local variety, presents different problems for treatment, and while I advocate prompt and heroic operative measures when called for—I know of few emergencies in surgery requiring more heroism on the part of the surgeon than those attending a secondary laparotomy under such circumstances—I would place emphasis upon the fact that comparatively few cases come within the range of such treatment, or require an operation looking to the evacuation of pus. The surgeon of experience should be able to say whether pus is present or not, and be able to locate it. Then but one line of treatment presents itself,—thorough evacuation and drainage wherever located. Otherwise no patient should be subjected to the shock attending an indefinite examination of the abdomen for a pus centre, many times greater than that belonging to the primary operation. Opening the abdomen for irrigation may sometimes be of advantage in septicæmia. Under such conditions it is a means of introducing normal salt solution into the circulation through the peritoneal absorbents. This manipulation is a small matter, very different from the handling of the intestines that is necessitated when seeking for pus.

Should an operation become necessary, even though involving an abdominal section, it may be done under local anæsthesia, and should be so done if possible, in order to avoid the additional tax upon the system of general anæsthesia. If, however, the latter is considered advisable, **nitrous oxide gas should not be used.** Patients with septic peritonitis suffer with more or less embarrassed respiration, their breathing is entirely above the diaphragm, and in consequence the blood is poorly oxygenated, and they are more or less cyanotic. To such patients nitrous oxide gas is a poison. It increases the already existing condition of the blood and the consequent systemic depression. Such patients require the stimulating

action of ether, which should be administered without prelimi-
nary nitrous oxide gas.

No general directions for operating can be formulated that
will meet all emergencies. Certainty of purpose, dexterity
and rapidity of manipulation will count for much. With an
operation so conducted there is hope of success, without it,
there is little.

I place great confidence in **infusion of the decinormal salt solution
in septicæmia.** Cases apparently progressing to a rapidly fatal
termination are arrested, and have ultimately recovered with
its use, but to obtain the best results we must not only select
the cases, but we must observe certain rules for its exhibition.
The principles upon which normal salt solution acts in arrest-
ing the progress of septic intoxication falls within the realm of
mechanics. *First.* The heart is sustained by supplying it with
pabulum upon which to contract; and, *second,* The blood is
diluted, a condition unfavorable to the development of micro-
organisms. Both of these conditions it is of the utmost im-
portance to establish and maintain, but in the first lies the
danger and the possible failure of the application of this
invaluable adjunct to our therapy.

If it is apparent that the toxine has so affected the vaso-
motor system as to cause its exhaustion, and consequent reduc-
tion of peripheral blood pressure, intravenous infusion is worse
than useless. The artificially strengthened pulse will soon
collapse, and the general stimulation of the increased blood
pressure give way to deeper depression. The impending heart
failure is not thus averted, but, on the contrary, hastened.
Such cases are not favorable ones for infusion of salt solution.

The chief danger in using intravenous infusion lies in the quantity
forced into the circulation. Warning in this direction is pos-
sibly not as necessary now as it was during the enthusiasm that
attended the first recognition of its great therapeutic value.
Certain it is that better and more permanent results follow the
infusion of a pint of salt solution, than resulted from the larger
quantities that we find formerly recorded. Over zeal in the
quantity used has led to more than one fatal collapse, and it
is better to infuse a small quantity at a time—eight ounces—

and repeat according to its effect and permanency. In the weakened state of the circulation it is not the part of wisdom to overtax either the nerves or muscles involved, and this is done if the venous system is pumped too full. Reaction will follow, from which recovery is impossible. The above remarks are especially applicable to the use of infusion in septicæmia, but they should also control our use of the decinormal salt solution where its exhibition is of the most marked utility—shock, either as the result of hæmorrhage or independent of it. Our object is not to overtax the heart muscle, but to supply a gentle stimulant in such degree as will offer resistance to its natural rhythmic contraction.

To a certain degree, but less prompt in its action, like results may be obtained by filling the rectum with sterile salt solution. Only exceptionally would this method possess advantages over the direct infusion. Generally the rectum must be utilized for nourishment, which precludes the possibility of its use for this purpose. In cases that give evidences of shock, or that suggest the possible complication of septicæmia, I am in the habit of ordering a high enema before the patient leaves the table. I formerly made this a routine practice after every laparotomy, but it is unnecessary unless especially indicated.

The regional anatomy of the peritoneum suggests that **the position assumed by the patient may assist in controlling the absorption of septic toxine** from the peritoneal cavity into the general system. While the entire peritoneum is a lymph sac, possessing powers of absorption, it has been shown that the tendinous portion of the diaphragm possesses this property in the highest degree, being rich in large lymph trunks and open mouthed stomata, while in the pelvic peritoneum the capillary lymphatics and stomata are comparatively small, and become easily plugged. Clinically it is known that primary septicæmia of the abdominal cavity, the septic toxines here first gaining entrance into the circulation, is severer in type and more rapidly fatal than that which is confined to the pelvic cavity, and this observation receives its explanation in the freer absorption of ptomaines in the superior than in the inferior region. The deduction therefore follows that by elevating the pa-

tient's head force of gravity will throw the ptomaines into the pelvis, where absorption is slow, and an opportunity is afforded for the natural digestive properties of the peritoneum to either neutralize, or destroy the harmful matter.

I have long allowed my **laparotomy patients to assume any position they desired,** and encourage their frequent change of position, believing that by so doing I favor functional activity of the peritoneum and of the intestinal canal, but to this freedom of motion, in the presence of septic infection, may be added with advantage elevation of the trunk. The degree of elevation may be determined by the comfort of the patient. Having in view this object, each patient should be placed in the extreme degree of elevation that her comfort will permit.

The fear that is frequently expressed of jeopardizing internal or external healing by any reasonable position that the patient assumes after opening the peritoneal cavity either through the abdomen or vagina, I think is in great measure exaggerated, and, as I have already said, I seek to encourage this. Any measure in the after treatment that will restore the natural function of the abdominal organs should be adopted, and if we can take advantage of the anatomical differences between the pelvic and the abdominal peritoneum, and call to our assistance nature's inhibitive processes, we should do so.

Of **remedies for septic intoxication,** aside from measures that promote the general well-being of the patient, little can be said of encouragement. The indicated remedy should always be administered, but I have not in these cases found the individual indications sufficiently characteristic to form very clear differentiations. Cases of septicæmia are much the same, having a common etiology, and the dynamic remedy will be found in that class of drugs which controls the centers of innervation, of waste and repair.

The treatment of shock as a sequela of operations upon the uterine cervix need scarcely enter into our consideration, so rarely does it develop, but as occasionally the capital operations of hysterectomy and oöpherectomy are found necessary for conditions developed in, or confined to the lower segment of the uterus, its discussion may not be amiss in this place.

The principles upon which our treatment will be conducted are rest and stimulation. The patient must be quieted, both physically and mentally. If she is restless, it is of the utmost importance that this should be controlled as quickly as possible, for as long as the hyperæsthesia of exhaustion continues the nervous system cannot right itself, nor resume its arrested function of innervation. The similar remedy to this state is *Morphine*. In large doses it causes a condition symptomatically identical with shock, but in smaller doses it takes possession of the system upon the very lines of the disease, while it, the system, recovers itself. Therefore I am in the habit of administering as a preliminary treatment in the incipient stages, one-eighth grain of *Morphine* hypodermically. Nervous tension is thus removed and the system placed in a condition to be acted upon by dynamic treatment. *Strychnine* is better suited to the heart requirement in shock than *Digitalis*, and may be administered hypodermically, but our main reliance will be placed on *Veratrum viride*. This remedy has in my hands almost entirely taken the place of other heart stimulants in the treatment of surgical shock. Its action is very prompt when administered in the tincture—I prefer Norwood's tincture—and more lasting in its effects than either *Strychnine* or *Digitalis*.

I have already spoken of the infusion of normal salt solution. Its greatest field of action is in surgical shock, but in common with other remedial measures must be used with discrimination. Not every case will be benefited by forcing fluid into the circulation, for, as we have seen, if the vaso-motor system is paralyzed, we are by so doing only increasing the abdominal and pelvic bleeding, which embraces the pathology of shock. But no case of surgical shock should be treated without a discussion of the advisability of infusing normal salt solution. It is safe to say that it is indicated in the majority of cases, and when indicated is a life-saving remedy.

The application of light dry heat to the entire body will not be neglected, but sometimes the method of application will defeat its object. Hot water bags and bottles are of use, but they should not press or bear any weight upon the body.

Nothing is better to maintain an even temperature or to equalize the body heat than heated flannels. Applied next to the skin they conserve the body heat, preventing radiation. The electric pad may be applied over the heart and chest. This is light and preserves any required degree of temperature. Above all things weight should be avoided. Light all wool covering, and a well ventilated warm room will meet the indications for restoring peripheral circulation. Stimulants are necessary, and I prefer their administration in enemas. If the normal salt solution has not been so given on the operating table a stimulating enema may take its place. The following formula I have found useful: *Brandy, one ounce; peptonized milk, two ounces; the white of one egg.* This should be given warm and just within the internal sphincter.

For the purpose of stimulation, in the light of modern investigation, all other substances must give place to alcohol; the questions to determine are, the form and method of its administration.

From the well-known fact that **neurasthenia is liable to develop after operations on the female genital organs,** it is of the utmost importance when possible, to become familiar with the life history of each patient before operating, and thus be able to institute treatment looking to the prevention or control of such results. Post operative neurasthenia has frequently been attributed to the anæsthetic. While this may occasionally be true, I think it is the exception, and that more generally the nervous conditions developed after the operation are due to a shock incident to the operation itself, or to the intensifying of an already existing state by reason of the reduced resisting powers of the system. It is not always possible to forestall this, but when we are warned from the previous history of the case that post-operative neurasthenia may occur, much may be accomplished by forced rest, and diet, extending over several days before the operation.

The symptoms of post-operative neurasthenia do not differ from those that characterize neurasthenia developed under other conditions, and the treatment will be such as to encourage rapid convalescence, maintain healthy metabolism, and such

individualizing of symptoms as to apply the similarly indicated remedy.

In **the medical treatment of post-operative neurasthenia** the tissue remedies stand out in well-deserved prominence, and of these *Kali phos.* and *Magnes. mur.* receive the first consideration. Their pathogenesy, especially that of *Kali phos.*, present a complete picture of an exhausted nervous system, and their exhibition will aid in the re-establishment of nervous equilibration.

CHAPTER VI.

GYNÆCOLOGICAL EXAMINATIONS.—GENERAL DIAGNOSIS.—THE SIGNIFICANCE OF PAIN.

An examination of the uterine cervix upon which to form a diagnosis, and map out a rational line for treatment, will necessitate a knowledge of the condition of all the pelvic organs, for, as some diseases that have their initial development in the cervix involve deeper structures, and rest in great measure for their diagnosis upon such involvement, it becomes of the utmost importance to obtain an accurate knowledge of the pelvis and its contents; to ascertain the size, position, consistence and fixedness of the uterus, ovaries and Fallopian tubes; to establish the condition of the pelvic lymphatics, and the relation of the bladder and rectum to the vagina and uterus. Moreover, it is necessary to accurately study the patient's general condition, for this is closely allied to many diseases of the lower segment of the uterus.

It will, therefore, be seen that a satisfactory examination of the cervix uteri includes a rather general gynæcological examination, and not an examination of the parts we are treating, only.

The surgeon will use his judgment in the extent of his examination. If he is called to treat a simple vaginal catarrh, he will not insist upon a thorough pelvic examination, but if the case is in the least obscure, and symptoms are present that are not satisfactorily explained by the objective presentment, a diagnosis and treatment should not be given before ascertaining the condition of the deeper structures and organs.

The Preparation for the Examination.—On the morning of the examination, in addition to the aseptic preparations already indicated, the lower bowels should be thoroughly emptied. If this does not take place naturally, a simple enema should be administered. A short time before that set for the examina-

tion the patient should empty the bladder. The clothing of the patient should be such as in no manner to interfere with the exposure of the parts, and free access to the abdomen necessary for a bi-manual examination. Nor should the clothing embarrass the movements of the patient, or prevent her from assuming any position that the surgeon may require.

The surgeon should be able to make an examination when and where it may be necessary, but when possible the table upon which the patient lies should be of such a height as will allow the examiner to stand while making his examination. His movements are thus free; he can use more force when pressing against the pelvic floor, and is able to watch his patient for evidences of suffering, evidences that the face must reveal. Such a height brings the surgeon, as he sits to use the speculum, on a convenient level for inspecting the external parts, the vagina and uterus.

When possible a nurse should prepare the patient for the examination, and this applies to those made for diagnosis as well as for treatment. She should arrange the patient on the table, and be present to assist her in readjusting her clothing. Such arrangements may seem matters of small importance, but we will remember that the patient is undergoing something that shocks her sensibilities, and that these small personal attentions when performed by a man, only increase the mental discomfort of the situation. In the question of convenience to the surgeon an office nurse is invaluable, for it not only relieves him from much petty detail, but assists him in preserving aseptic conditions.

The surgeon will prepare his hands with care. In his own examining room he will be provided with all that is necessary, and he should carry in his instrument bag tincture of soap, creoline, and a sterilized nail brush. The importance of the latter is not always appreciated. I have seen surgeons go through all the steps of antiseptic hand preparations, and then use the nail brush that is found on the toilet stand. It is well if the surgeon can remove his coat and wear a white jacket. This not only protects him—his coat sleeve is very liable to become soiled—but also affords no opportunity for carelessness in touching his clothing after "scrubbing up."

All instruments used will, of course, be aseptic, and the number of instruments will be in indirect ratio to the experience of the surgeon. When possible he should avoid placing anything between his fingers and the object with which he wishes to make himself familiar, remembering that there is no substitute for the tactile sense, and that that cannot fail to lose in delicacy as the distance increases between it, and the object examined.

Equal training of the hands is of advantage to the surgeon. In general the right index finger will be used for the internal examination, while the left hand examines from the outside, but occasionally, if the point for especial diagnosis rests in the left pelvis, and the vagina is deep and the examining finger short, this position is conveniently reversed, for it should be remembered that the palmar surface of the finger affords the most sensitive tactile point, and sometimes it is not possible to bring this portion of the finger in relation with every part of the vaginal vault or the floor of the pelvis.

The position of the patient will depend upon the nature of the examination and the object for which it is made. If abdominal, she will lie on her back, with the surgeon standing on her right side. For general inspection she should lie freely extended, with the abdomen, from the pubes to the ensiform cartilage, uncovered. Inspection then gives knowledge of the general contour of the abdomen and enables us to detect any prominence that may exist in its contents; the condition of the abdominal walls, its fat, rigidity, or degree of relaxation.

The further examination will be made by percussion and palpation, and should be pursued systematically, each section being examined and each organ mapped out as it is situated, from the starting point. I prefer to begin in the epigastric region and work into the pelvis, though this is entirely an individual matter and probably possesses no other advantage than that of familiar usage.

Though percussion familiarizes us only with the density of bodies, it is of value when educated in the delicacy of sound, in locating points for further examination.

Our principal reliance will be placed on palpation. By this means

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the contour of every organ in the abdomen and pelvis can be
mentally inspected.   It is important that the examiner's hands
are warm before touching the patient. A few minutes' soaking
in very hot water serves the purpose of cleansing, warming and
increasing their suppleness.

If we remember the **principle of palpation,** that of bringing the
part examined between our hand and some resisting object, we
will find no difficulty in applying this diagnostic instrument to
an examination of the abdomen, or in appreciating its value
in obtaining an exact knowledge of the organs which it and
the pelvis contain.

When palpating, the arm and forearm should be fixed at the
proper angle, changing according to the region examined, and
all force applied from the wrist.   Neither should much force
be used, and never should it be applied suddenly.   Gradual,
steady, firm pressure is the rule.   Nothing should be uncer-
tain.   Having a knowledge of how the viscera are in health,
and such knowledge is absolutely essential to an accurate
diagnosis, we are in a position to mark their deviation from
that standard, with a minimum degree of force.

Beginning in the epigastric region, the right hand, if the
surgeon stands on the patient's right, the left if he stands on
her left side, with a slight creeping motion made between the
wrist and the finger tips, similar to the motion of a caterpillar,
is passed lightly over the entire surface.   This makes use of
the resisting portion of the abdominal and pelvic walls as a
point against which to detect gross lesions; confirms the im-
pressions received from percussion, and lays out the ground
for further and more definite examinations.

Each organ and ascertained pathological focus is now ex-
amined systematically, both hands being used, the right press-
ing against the left when the pressure is lateral.   By an exag-
geration of the caterpillar motion definite regions may with
ease be brought between the palm of the hand and the tips of
the fingers, this especially if the palm of the other hand is
used, against which to make pressure.   By repeated examina-
tions conducted in this manner, placing the patient first on
one side and then on the other, every organ in the abdomen

can be brought under the inspection of the fingers, and its departure from health, if characterized by any physical marks, detected.

For **the examination of the pelvis,** and with this we are here especially concerned, we will first familiarize ourselves with the condition of the pelvic floor. This will be accomplished through the vagina, and by means of the bi-manual method, but first the vaginal. If this has been preceded by an examination of the abdomen, the hands will again be made aseptic before the finger is introduced into the vagina.

The choice of position the patient is to assume will depend upon the object of the examination and the practical experience of the surgeon. In general, the dorsal position with the legs flexed, bringing the heels on a line with the buttocks, will afford every facility for a digital examination, at the same time that it gives an opportunity for inspection of the external and internal parts.

Standing between the patient's knees—unless for the most superficial examination sitting at the side of the patient with her corresponding leg flexed, is not to be advised—the surgeon, pressing the palmer surface of the right index finger against the fourchette, allows it to enter the vaginal slit. The examination then begins, as with a slight rotary motion he notes the condition of the vagina, until he reaches the vaginal vault, which he sweeps around from right to left, encircling the entire vaginal portion of the cervix. He will note the degree of smoothness of the mucosa, the length, size and consistence of the cervix, the angle it bears to the vagina and to the uterine fundus, its movableness or otherwise in the pelvic floor, its relations to the peritoneal reflection at the broad ligament; the condition and the position of the utero-sacral ligaments, and the position and size of the uterine arteries. A single, slow, careful sweep of the finger, which must contain eyes as well as brains, will satisfy the surgeon upon these points.

By bringing the finger downwards, always keeping its palmer surface in contact with the point to be examined, the os uteri comes under inspection. Then will be noted the size and regularity, or otherwise, of the opening, the condition of

the mucosa, whether smooth, rough, or granular; whether it is movable or attached to the underlying connective tissue; the development of its follicles, the degree and kind of resistance offered, and any deviation from the general sensation of compactness and regularity of outline that belong to the normal os. When a large dilated and patulous os obtains, it is possible to carry the digital examination into the cervical canal, even to the internal os, and so ascertain the state of its mucosa, whether firm or soft, almost slimy in some cases, whether its folds are well marked or obliterated, whether it is free or contains a foreign body.

Without removing the finger we are now in a position to make an examination of the pelvic contents by means of the bi-manual method. We thus bring the uterus and appendages, pelvic lymphatics and peri-uterine structures, as well as the bladder and rectum, under inspection.

Examination of the Uterus.—With the fore-finger pressed firmly against the os, and to accomplish this satisfactorily it is sometimes necessary when the vagina is long or the surgeon's fingers short, to force his finger onward by the surgeon pressing his body against his elbow, almost any degree of force may with impunity be applied, if pressure is not made against the anterior vaginal wall, the urethra and clitoris. The doubled knuckles of the second, third and fourth fingers should be brought against the perineum, and the curve between the thumb and fore-finger fitted to the pelvic arch. The tips of the fingers of the left hand, the fingers being slightly flexed, the ball of the hand forming the other end of the arch, are pressed deeply into the abdomen, immediately below the umbilicus, and, working downwards towards the pubes, the intervening structures are pressed against the finger in the vagina at the same time that they are gathered up in the palm of the left hand. Practice in this maneuvre will enable one to follow the course of the sacrum, and thus examine the posterior aspect of the uterus and its general contour. It will also bring under inspection the posterior cul-de-sac and its contents.

By resting the ball of the hand against the pubes, the uterus

is brought between the pubic arch in front and the index finger below, and the slightest deviation from the normal in length, position, general outline, consistence and mobility can be detected.

The anterior uterine surface may be examined by pressing the finger tips behind the pubic bone. This will inform us as to the condition of the bladder and its relation to the uterus, but inasmuch as the posterior cul-de-sac is surgically more important than the anterior, and is more frequently the seat of pelvic pathology, its examination will possess superior interest, and the knowledge so obtained will assist in making a more certain gynæcological diagnosis.

The normal posterior cul-de-sac contains only the utero-sacral ligaments and a few small lymphatics. These ligaments, the chief supports of the uterus, are readily reached by pressing the finger firmly backwards in the median line towards the sacrum. The finger then lies between the ligaments, which are recognized on either side of the pocket, or cul-de-sac, as two bands passing from the upper part of the cervix uteri to the third sacral vertebra. They should be more or less elastic, pressure upon them moving the uterus.

The utero-sacral ligaments early become involved in malignant neoplasms of the cervix, and in pelvic cellulitis, when their outline is obscured and their structure incorporated with the pathological mass, or the exudate that occupies the region behind the uterus. Contraction of the ligaments is always present in anteversion of the uterus, and presents no difficulty in detection.

Examination of the broad ligament, the ovaries and Fallopian tubes. —All the important structures and organs that are situated between the uterus and the cavity of the ilium are connected with the broad ligament, but independently of this anatomical relation the broad ligament is itself of the first interest in studying pelvic diseases, and is always a structure to be reckoned with. This arises from the fact that the two layers of peritoneum, which, together with connective tissue and involuntary muscular fibres constitute the framework of the broad ligament, or pelvic diaphragm, are very loosely attached to

the underlying connective tissue, not only the portion that belongs to the ligament proper, but that also which lies between it and adjacent organs, the bladder, rectum and pelvic walls. By reason of this, fluids and solid bodies occupying the intra-peritoneal spaces of the broad ligaments have a tendency to dissect the peritoneum from its attachments, and practically to obliterate the organ. If, therefore, we cannot distinguish the broad ligament in making an examination through the vagina, we may conclude that we have to deal with some pelvic pathology.

The **broad ligament** always corresponds in the direction of its axis, to the position of the uterus, save in its inferior portion, which is more or less fixed, inasmuch as the lower segment of the uterus is not subject to the same variations in position that belong to the corpus uteri.

In the dorsal position, the uterus being in normal antiflexion, the broad ligament is pointed upwards and forwards, describing almost an acute angle with the table on which the patient is lying. The index finger pressed firmly into the vaginal vault will detect a cord-like resistance about on a level with the internal os, running laterally, to become merged into the walls of the pelvis. This body is more or less yielding by reason of the lower attachment of the peritoneum already referred to, and may be described as similar in sensation to a rubber band that has by reason of age lost much of its elasticity. This is the inferior border of the broad ligament, and is the only portion of the structure that can be palpated in health.

Firm upward pressure away from the cavity of the sacrum, against the hand on the outside of the abdomen, will be found to carry the lower segment of the uterus towards the side examined.

We will note the degree of elasticity of the lower border of the ligament; its breadth, as indicating whether or not the intra-peritoneal space is occupied with effusion or a solid body. As already stated, the lower border of the ligament may be entirely effaced, and the lateral uterine spaces occupied with a more or less illy defined mass. We may then

reasonably conclude that the foreign body lies between the peritoneal layers of the broad ligament, and is extra-peritoneal.

Important structures are imbedded in the broad ligament that are distinguishable without reference to the ligaments themselves. **The uterine artery** can be made out as it courses along the lower border of the ligament, from where it branches from the internal iliac artery, to the side of the uterus. This artery is of considerable magnitude and can be palpated in the position indicated, but if it seems to be larger than usual and to pulsate with more force than the other arteries,—the radial artery may be used for comparison,—there is probably present some intra-uterine growth that requires an extra supply of blood, endometritis, *dicidua maligna* or some form or degree of fibro-myoma. I do not recall a single instance in which I have observed this condition of the uterine artery, that I have not found causes of the nature indicated, in the corpus uteri. Excluding other pathology, I have sometimes been lead to diagnose uterine fibroid from this symptom alone, the diagnosis being verified by an intra-uterine examination. A similar development of the uterine artery is found in the early months of pregnancy, but the two conditions need not be confounded; other symptoms will serve to distinguish the gravid uterus from any pathological condition.

Palpation of the pelvic ureters, especially as they pass through the broad ligament, should form a part of every gynæcic examination that seeks to establish a thorough knowledge of the pelvic organs.

The urinary duct will be recognized as a tense resisting cord, passing directly above the transverse portion of the uterine artery, crossing it at right angles, in its course towards the bladder. By hooking the index finger behind the broad ligament, the pulsation of the uterine artery serving as a guide to reach the ureter, the tense cord can usually without difficulty be rolled against the fingers of the other hand, pressed deeply behind the pubic bone. No invariable rule can be given for the distance of the ureters from the uterus, because changes in the direction of the uterus, or increase in its size, will of necessity alter the area of the peri-uterine spaces. The most

trustworthy guide is the uterine artery; this found, the recognition of the ureters will depend upon the physical characteristics of a resisting, non-pulsating tube, placed above the artery and directed in front of the uterus, towards the pelvic brim. If the situation of the ureters becomes a matter of paramount importance, as before a vaginal hysterectomy for malignant disease, when it is essential to learn the exact relation of the ureters to the disease focus, catheterization of the ducts will establish beyond doubt their course and direction.

Remembering that the direction of that part of the broad ligament that contains the organs important for examination, corresponds to the temporary axis of the superior segment of the uterus, by pressing the index finger slightly backwards and forwards, conforming to the course of the sacrum, **the ovarian or pampiniform plexus of veins** is brought under digital inspection.

In the normal condition the pampiniform plexus of veins—the homologue of the spermatic plexus in the male—is not distinguishable by pelvic examination, but when dilated, or for any reason enlarged, as in varicocele, the venous network is recognized as a mass of elastic, convoluted tubes—the classic convoluted, earthworm feel—situated below the ovary, about midway between the uterus and the cavity of the ilium. By judicious massage the veins can be emptied, which, together with their slow refilling, serves to establish the diagnosis of a pathological enlargement.

Utero-ovarian varicocele is of more frequent occurrence than is generally believed. It is very frequently an accompaniment of ovarian pathology, but may exist independently of other disease.

Unless some unusual condition, as a very long vagina, or thick abdominal wall, exists, **the healthy ovary** can be brought under the inspection of the examining finger. A frequent mistake made, and one that renders digital examination of the ovary difficult, is the impression that the ovary is a more or less dense body, and must impart to the finger a corresponding sense of resistance; the truth being that the ovary is a soft, rather elastic body, and that in consequence a too heavy touch will altogether pass over and fail to detect the gland.

Lying as it does near the superior border of the broad ligament, which in turn represents the level of the fundus uteri in the pelvis, by pressing the external fingers that rest on the abdomen well behind the uterus, and gradually insinuating them laterally to meet the finger in the vagina, which is carried upwards and outwards, the soft, slippery ovary is brought between the two examining hands. Under ordinary circumstances this examination presents no difficulties, and the surgeon should be able to make his diagnosis without the coöperation of the patient. Indeed, the healthy ovary is almost insensitive to moderate pressure, the peculiar sickening sensation caused by manipulation of an ovary indicating disease.

The knowledge obtained by digital and bi-manual examination of the ovaries is limited, as far as the finer points of diagnosis are concerned. We can say whether or not the ovary is displaced or is adherent; whether it is enlarged, hard or cystic; but the nature of the enlargement, the exact relation to other organs, the character and extent of the adhesions, we cannot tell until the abdominal cavity is opened and our fingers actually touch the diseased organs.

A healthy Fallopian tube cannot be made out by palpation, but the diseases that develop in the ovi-ducts so change their position and contour that their recognition in disease is not attended with much difficulty.

A diseased Fallopian tube shows a marked disposition to displacement, falling into the posterior fornix, and so coming to lie behind the uterus. In most instances tubal diseases are characterized by swelling, and this swelling, by reason of the duct being fastened to the broad ligament on one aspect, and free on its superior border, gives rise to irregularities in its contour. Pouch-like divisions if fluid is present, and corresponding solid irregularities if hypertrophy exists, develop, and these, probably from their weight, fall backwards and downwards, without dragging the broad ligament with them unless inflammation has massed the appendages together, then tubes, ovaries and broad ligaments form a tumor of exudate.

By following the superior border of the broad ligament outwards from the uterine cornua, the congested, inflamed or pus

tube—**salpingitis**—before appreciable enlargement has taken place, will be recognized as a sensitive line, spreading towards the pelvic walls, but in general a diseased Fallopian tube is not found in the position of the healthy organ, we find it in the posterior cul-de-sac.

From **a prolapsed ovary** it is marked by a sausage-like shape and a convoluted outline, as distinguished from the smooth or nodulated cystic surface of the genital gland. The Fallopian tube in the posterior cul-de-sac is usually not movable, being fixed in that position by plastic exudate. This is a feature of all tubal diseases.

The **round ligaments,** unless rendered tense by dislocation of the uterus, are difficult if not impossible to bring between the examining fingers. Their course, from the horn of the uterus to the inguinal canal, can be palpated by bringing the finger that is in the vagina, from the uterine cornua, forward to the pubic bone. If in this position a body is encountered, after excluding the ovary, we may suspect a **tumor of the round ligament.** **Fibroid tumors** and **sarcomata** have developed in this organ, and **hydrocele** of the round ligament, though rare, does occur. The latter affection is more strictly an external tumor, but may extend along the course of the ligament and present as a cyst within the abdomen, communicating with the external cyst.

The intimate relations between the lymph system and malignant diseases of the uterus, indicates the importance of recognizing the earliest evidences of disease of the lymphatic glands into which the lymph channels of the reproductive organs empty.

The lymph channels themselves we cannot make out by palpation. We have seen that they cover the uterus and ovaries, Fallopian tubes and broad ligaments, in the form of a most intricate network, but they are soft and non-resisting. Neither can the normal glands into which they empty be distinguished; only when they fail to perform their function of digesting and passing on the material they receive, when they enlarge and become hard from the accumulation of emboli which the phagocytic action of the lymphocytes of the gland is not able to dispose of, can they be made out by the examining finger.

The ilio-pelvic and inguinal glands are the ones with which we are especially concerned. The former are situated at the bifurcation of the iliac artery and receive the lymph channels from the lower segment of the uterus. From this upper ganglia, communicating branches dip into the pelvis and follow the course of the hypogastric artery. One or more glands that lie near the obturator foramen communicate with the ilio-pelvic system, and are found enlarged in malignant diseases of the cervix.

The ilio-pelvic glands can be reached through the vagina or the rectum; the former entrance to the pelvis will usually prove the most satisfactory for examination and diagnosis, but may sometimes be combined with a finger in the rectum. The index finger in the vagina finds the internal iliac artery, and following that as a guide, by firm pressure upwards and outwards, the point of bifurcation of the common iliac is reached. This will be slightly above the level of the uterine fundus. If the glands are enlarged they will be discovered at this point, otherwise they cannot be made out.

The lateral sacral glands, which receive some of the cervical lymphatics that follow the course of the sacro-uterine ligament, are situated slightly below the iliac glands, but cannot be separated from them by palpation.

The ganglia situated near the obturator foramen are reached by pressing the finger outwards and upwards, in the direction of the ramus of the pubic bone. The foramen will thus be reached, and the enlarged glands will be found near the posterior rim of the opening. Enlargement of the glands in this location signifies disease of the lower segment of the uterus and the upper part of the vagina.

There is situated in the great sacro-sciatic foramen a series of glands that early become enlarged in epithelioma of the cervix. They are best examined through the rectum, because by this means the foramen is more readily reached. Pain in the sciatic nerve associated with pelvic derangements should always lead to an examination of this group of lymphatic glands, because upon their condition rests in great measure the diagnosis of early pelvic disease.

The lumbar glands, also important in connection with the diagnosis of pelvic diseases, are, unless greatly enlarged, difficult to examine, because of their deep situation behind the psoas muscle. They can be reached only by pressure on the abdomen, at a point slightly above the umbilicus. As they receive lymph from the fundus of the uterus, the ovaries and Fallopian tubes, their enlargement strengthens a diagnosis of malignant disease of these organs.

The inguinal glands are readily found resting on the ramus of the pubis. Their enlargement signifies infection from the fundus of the uterus, inasmuch as the lymphatics from that portion of the uterus pass into their ganglia.

A chain of ganglia extends from the ilio-lumbar glands, follows the course of the iliac vessels to the crural canal, and thus gains the inguinal glands. By this avenue of infection the latter series of glands becomes secondarily affected when the initial pathology is in the lower segment of the uterus, but this secondary development usually marks a late stage of neoplastic growth, and is always attended with crural neuralgia, caused by pressure of the enlarged lymph glands on the crural nerve.

The significance of pain in directing or supporting a gynæcological diagnosis must not be overlooked. Commonly the character and location of the pain from which a woman is suffering who presents herself for treatment will serve as a guide to differentiate, and as a central point around which to build a diagnosis. The same group of symptoms will also confirm the opinion that has been derived from a physical examination.

Gynæcological pains are either local or reflex. The local pains are in the organ affected, and are such as would be indicated by the local pathology.

A dull persistent pain in the region of the uterus and back, aggravated by motion and relieved by lying down, and generally by the menstrual flow, indicates chronic metritis.

Dull aching and throbbing pain in the region of the ovary, going through to the sacro-iliac-synchondrosis, with an area of superficial tenderness corresponding to the distribution of the tenth dorsal, posterior nerve root—a band that extends from the first, second and third lumbar vertebra—forwards and downwards

to the median line on a level with the umbilicus, belongs to ovarian irritation, whether acute or chronic.

Dull aching through the lower pelvis, not confined to any one location, aggravated by standing—walking though uncomfortable is not so distressing—relieved almost immediately by lying down, points to chronic pelvic cellulitis. In such cases the uterus is not involved, but the floor of the pelvis, the pelvic fascia, and the cellular tissue that supports the uterus and ovaries, the bladder and rectum, are implicated.

Dull sacral pains, more or less constant, extending down, more commonly one, less frequently both thighs, occasionally following the course of the crural nerve, passing down the inner side of the thigh, not affected by position, suggest some neoplasm of the uterus, in many cases malignant.

Occasional bearing down pain, relieved in the morning after resting at night, greatly aggravated by standing, with pain in the hollow of the sacrum, usually indicates prolapsus of the uterus; **while persistent, dull, sickening pain in the sacrum,** relieved only after lying down a length of time, suggests retroflexion. With retroflexion there is liable to be irritation of the bladder, and an inability to retain the usual quantity of urine during the day.

Sharp pains are caused by muscular contractions, and may be rhythmical or without regular intervals. **Rhythmical pains** are usually uterine, the habit of that organ being to measured contractions, indicating unsuccessful attempts at expulsion of its contents. Sharp unrhythmical pains in the iliac fossa indicate an attempt of the Fallopian tubes to force something, either into the uterus, or the abdominal cavity, the tubes being occluded or inflamed. Dysmenorrhœa of this type, when the pain precedes the menstrual flow, usually indicates tubal disease.

Sharp pain in a fixed part of the abdomen, induced by intestinal vermiculation, and aggravated by motion and pressure, accompanied with tenderness, indicates local peritonitis, or visceral peritonitis. The parietal peritoneum is not normally sensitive, which accounts for the slight pain that accompanies pelvic cellulitis, even when the peritoneal covering is involved. With general visceral and parietal peritonitis there is liable

to be in connection with the sensitiveness to pressure, marked superficial tenderness directly over the region involved.

A sudden sharp pain in the abdomen is caused by some mechanical violence done to the peritoneum. If this is accompanied by air hunger, a soft pulse and faintness, the case is probably one of hæmorrhage from a ruptured ectopic pregnancy, if the menstrual history warrants such a diagnosis. If no such history can be made, and pain follows upon pelvic inflammation, either of the peritoneum or the cellular tissue, we may conclude that a pus focus has ruptured into the peritoneal cavity. Sudden sharp abdominal pains, with the circulation symptoms that attend hæmorrhage, and the rapid development of a soft tumor in the posterior cul-de-sac, are almost certainly caused by hæmorrhage into the peritoneal cavity— an hæmatocele.

The pains connected with the menstrual function furnish valuable assistance in diagnosing the seat of dysmenorrhœa.

A constant dull, severe aching pain in the pelvis, preceding by several days the menstrual flow, relieved after the first twenty-four or forty-eight hours, and by rest in the recumbent position, indicates congestion, which may be confined to the uterus, but more commonly involves the ovaries and tubes as well. **A similar pain, just internal to the anterior iliac spine,** points to the ovary as the primary seat of the congestion.

A constant aching, throbbing, gathering pain in the back, extending down the thighs, but slightly relieved by lying down, accompanied with dysuria, that begins before menstruation and lasts for two or three days after the flow is established, points to an acquired congestive dysmenorrhœa, or that form which has followed upon some other pelvic pathology.

Severe pains in the uterus, paroxysmal in character, the paroxysms of short duration, aggravated by lying down, frequently causing nausea and vomiting, that recur with the menstrual flow and are relieved when the flow is established, indicate obstructed uterine drainage, usually stenosis of the os uteri.

This group of symptoms developing gradually when menstruation has appeared later than the usual period of puberty, indicates an infantile uterus, or one that has become arrested

in development and is not able to perform the full function of decidual formation thrown upon it by the ovaries and Fallopian tubes.

Pain having the character of labor pains, originating in the uterus and spreading to the back, expulsive and bearing down, accompanied with a scanty flow, entirely relieved by the expulsion of membrane, will at once be recognized as the pain of membranous dysmenorrhœa, or an aborted attempt at the formation of a decidua.

Dull pain in the pelvis in women who have borne children, with profuse irregularly recurring menstruation, in pronounced cases almost a constant leaking of blood, suggests the presence of *deciduoma maligna*.

Pain having the character of congestive dysmenorrhœa, but located chiefly in the ovarian region, recurring periodically, but between the regular menstrual periods, indicates the rupture of an abnormally thick Graafian follicle, and the discharge of an unripe ovum—intermediate dysmenorrhœa.

Reflex gynæcological pains are more useful in indicating the organ affected, than the particular manner of its affection.

Such reflex symptoms receive their explanation in the innervation of the reproductive organs, though why an injury to terminal nerve fibres should be felt, not at the seat of the injury or in the line of transmission, but at a remote point, is not satisfactorily accounted for. The nerves of the pelvis and pelvic organs are both spinal and sympathetic. The spinal nerves, the pudic, fourth and fifth sacral, and coccygeal, which supply the perineum, levator, and sphincter muscles, and also the clitoris, send branches through the sacral ganglia to the hypogastric plexus, which union makes up the inferior hypogastric plexuses, situated on either side of the uterus. Branches from these pass to the vagina, Fallopian tubes and ovaries, where their nerve endings are most intimately associated with the minute histology of the organs to which they are distributed. This intricacy of nerve communication encourages the transmission of impressions, and the interchange and accentuation of sensations, and the nervous energy thus accumulated expends itself at the point, near or remote, that chances through

previous derangement to be *en rapport* with the vibrations of pain elsewhere generated. In other words, we have a transmitter and a receiver, two parts tuned to each other. This theory of remote and reflex gynæcological pains, which seems at least to be worthy of consideration, involves a belief in a weak or susceptible point connected with the nerve distribution of the reproductive organs.

Persistent, sharp radiating vertical headache will direct attention to the uterus as a cause; **occipital and cervical pain,** to the ovaries, but neither of these conditions could be induced by the uterine and ovarian disorders unless there existed a previous neurasthenia, for it will be remembered that these forms of headache are among the most frequent manifestations of nerve exhaustion, and may be present without either uterine or ovarian complications. Conversely the latter may exist in aggravated forms without reflex symptoms. They are, however, associated with sufficient frequency to direct attention, in the presence of these special forms of headache, to the uterus and ovaries as possible causes.

Pain in the vertex is frequently associated with, and doubtless sometimes caused by a lacerated uterine cervix.

Recurring sharp pain in the infra-mammary region, the external surface of the hip, and palm of the hand, have been associated with a contracted ovary; gross lesions of the gland are not as frequently seen to cause reflex symptoms, with the exception of the *faces ovarini*, a diagnostic feature not often met with now-a-days, for dropsy of the ovary is not allowed to assume the proportions it formerly did before a radical operation is performed.

Pain in the hollow of the sacrum frequently accompanies disease of the lower segment of the uterus, especially has this been observed when chronic catarrh of the cervix is present. Though the cervix uteri is not at all sensitive when healthy, as shown by its tolerance of mechanical manipulation, when diseased, so constantly is this reflex symptom present, that a diagnosis of chronic cervical catarrh could rest upon it alone, and the location of the leucorrhœa be determined without the assistance of a vaginal examination, or before one is made.

CHAPTER VII.

LACERATION OF THE UTERINE CERVIX.

The embryonic lines of tissue fusion are less able to resist tension than those parts of the body that are built up by a continuous cell multiplication and division. Such places are weak, for the reason that the fusion, from many causes to which the developing organ is subject, may not be completed, and in those places development is especially liable to be arrested, inasmuch as the non-fused organ represents a permanent form in some organisms lower in the animal scale, and one through which the human animal passes in the process of evolution to its perfect form.

Until the sixth month of embryonic life the future cervix uteri is represented by an anterior and posterior lip, the separation being effected by lateral clefts that extend to the vault of the vagina. As development proceeds, fusion takes place between these clefts, down to the opening left for the external os uteri, so that by the seventh month the lower segment of the uterus appears as a canal leading from the body of the uterus to the vagina.

The frequency with which lacerations of the uterine cervix are bi-lateral, leaves no doubt but that the lines of fusion present anatomical points less able to resist dilatation than other parts of the canal, and suggests the query, whether or not a slight **bi-lateral laceration of the uterine cervix is a physiological result of child-bearing**, and quite conformable to the health of the uterus. The hymen is lacerated usually in the line, antero-posterior, that marks the fusion of the terminal parts of the Mullerian ducts, and the fourchette yields at the median line of fusion of the genital folds. Both of these lacerations are physiological, were they not so, it is reasonable to assume that weak points would not exist where naturally an unusual degree of strength is called for.

No single gynæcic condition has given rise to the same degree of discussion concerning its pathological significance and

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importance as an initial factor in the diseases of women, as the lacerated uterine cervix. Almost every disorder of multiparous woman, has been, either directly or indirectly, traced to a lacerated cervix, but that the etiological importance of this condition has been overestimated, save in the matter of the development of malignant neoplasm, cannot, in the light of the more exact pathology of to-day, be doubted.

The lacerated cervix, *per se*, **is not of necessity a menace to health.** That it frequently is associated with, if not productive of both local and reflex pathology, is a matter of daily observation, but there is no evidence to support the belief that such is of necessity so. Many women pass through life without a knowledge of the existence of a lacerated cervix, and without symptoms that could be referred to an abnormal condition of the uterine os. Nor does the extent of the laceration bear any ascertained relation to the effect produced, a stellate laceration frequently giving rise to less disturbance than a single or bilateral tear. We must, therefore, seek for conditions outside of the laceration that conspire to make it the cause of the local pathology, and profound reflex disturbances that we know are in some instances attendant upon a tear in the uterine cervix.

A lacerated cervix rarely exists alone or without some other mutilation of the genital organs, or of the pelvic floor. This fact is not always given its etiological importance, for it is probable that the disturbances attributed to the laceration are frequently in a measure, caused by other injuries coincident with that of the lower segment of the uterus. Laceration of the perineum and of the pelvic floor gives rise to reflex symptoms that may erroneously be referred to the cervix, and thus attention is directed away from the real source of the disorder.

There is no mechanical reason why laceration of the cervix should interfere with the circulation of the uterus to such an extent as to arrest the proper and systematic involution of the organ. Only the smaller arterial branches are usually severed, and these are not a sufficiently important part of the uterine circulation to affect so profoundly, one way or another, the nourishment of the entire organ. Neither does it seem prob-

able that a simple tear, or a complicated one, of the lower
segment of the uterus, can, without the coöperation of other
conditions, result in the local pathology and reflex phenomena
that we associate with a lacerated cervix.   In the healthy par-
turient woman tissues heal rapidly and without complication,
and there is no reason that the same laws should not obtain for
the lacerated cervix that control other injuries.

We cannot regard subinvolution of the uterus, ulceration of
the os, hypertrophy of the cervical glands, cervicitis and the
graver forms of neoplasms, all of which exist as sequelæ of
a lacerated cervix, as necessarily dependent upon the lacera-
tion.   They may and frequently do exist without the lacera-
tion, and probably from the same causes that are potent when
the laceration is present.   We have, therefore, a tear in the
cervix, plus the influences that determine the location of dis-
ease at that place.

**The principal, if not the sole cause of the sequelæ of laceration of the
uterine cervix, is not the solution of continuity of the canal, but the
septic infection that takes place at the time of the tear, or before, in the
natural healing of the wound, protective granulations have covered
the lacerated surfaces.**   To sepsis we are to attribute vicious
healing of the laceration, that is, healing by granulation, not
by first intention, which would at once present a barrier
against absorption, and restore the cervix to a normally func-
tionating organ.   Healing by granulation not only destroys
the cervical canal, but it favors the formation of cicatricial
tissue, and introduces a process of cell proliferation, which
under the influence of local irritation constitutes an important
link in the chain of pathological new formations.

Septic infection plays a chief part in the etiology of all
uterine and pelvic diseases that are characterized by inflam-
mation and its various products, and one of the most frequent
channels by which pathological organisms gain an entrance to
the pelvic organs is the lacerated cervix.   The abnormally
wide open canal permits the entrance of septic organisms into
the uterus, where, attacking the endometrium, endometritis fol-
lows, or gaining an entrance through the traumatically opened
lymph channels of the cervix and those of the base of the

broad ligament, the deeper structures of the pelvis are infected, local nutrition is interfered with, cell proliferation proceeds upon exaggerated lines, exudates take place, and in consequence the uterine body remains large and heavy, conditions that predispose to misplacement and its attending phenomena.

The histogenesis set in operation in the lower segment of the uterus by septic infection of the cervical tear is in the direction of hypernutrition, and the rapid proliferation of undeveloped immature cells. Embryonic "left-over-cells" are excited to activity under the influence of the micro-organisms, and thus is favored the development of foci of erratic cell formation, an early step in the history of malignant growths.

Laceration therefore of the cervix uteri, like many other wounds, is in itself not of special significance, but assumes pathological importance in proportion to the extent to which it becomes a channel for the admission of septic organisms into the lymph circulation, and by reason of local overstimulation, initiates processes of erratic cell proliferation, that pass beyond the limits of "work," and assume the function of "vegetation."

Laceration of the uterine cervix may be congenital—fissure of the uterine cervix,—or acquired. The former has been described, *Anomalies of Development and Congenital Defects Chapter II.* It is of rare occurrence, and not likely to give rise to more than cervicitis and cervical catarrh. The graver pathology of the acquired laceration probably does not belong to the congenital fissure. If treatment is called for it should be on the same lines that are necessary for the acquired tear, local medication to relieve the local hyperplasia, and operative procedures to complete the cure.

The vast majority of **acquired lacerations of the uterine cervix** owe their origin to the passage of the child during parturition, from the uterus into the vagina, or to some mechanical endeavor to aid nature in her efforts at delivery. A method of treatment for stenosis of the cervical canal, now but rarely resorted to, incision of the entire thickness of the muscularis, has occasionally resulted in non-union of the cut surfaces. Such

cases resemble the parturient laceration that has not included all the structures of the canal. It is also probable that mechanical abortions, and the dilatation of the cervical canal with instruments or tents has been the cause in some instances of laceration, especially if the manipulation has been in unskillful hands.

The mechanism of lacerated cervix is simple. If the musculature does not yield to the forward pressure of the oncoming child, it must rupture, and this is what takes place in the majority of instances.

Among **the predisposing causes of lacerated cervix** are the embryonic development already alluded to. The parts of the canal least able to bear the strain of dilatation necessary for the passage of the child, are the lines of lateral fusion, and here we find as a matter of fact, that laceration most frequently occurs.

Any general condition existing before conception that tends to malnutrition of the uterus, especially the lower segment, or any local condition, as flexion of the uterus or inflammation of the cervix, both of which cause deficiency in the muscular structures of the cervical body, are potent factors in preventing the rhythmical dilatation that should proceed hand in hand with the contraction of the body of the uterus.

The cervix takes no part in parturition or in expelling the child from the uterus. Its function is a passive one, that of guarding the uterine cavity. This office is gradually yielded as the canal becomes obliterated in the last months of pregnancy. The structures becoming either too tense or too soft, are conditions equally fatal to the normal passage of the child.

The frequency with which the uterine cervix is lacerated in parturition has been differently estimated. As before stated, I believe this to be the rule rather than the exception, and also that a laceration in the very large percentage of cases takes place at the first delivery. With subsequent confinements the primary tear may be deepened or others added, depending upon the health of the cervix at the time it is called upon to dilate, this condition possibly being left over from the pathology of a previous confinement. In this manner a cervix but slightly torn

in a primipara, so slightly as to escape observation, may in a multipara become deeply lacerated, or the seat of multiple lacerations.

The most common seat of laceration of the uterine cervix is the left commissure. This may be because the left side of the body is not quite as strong as the right side, or more probably because the most frequent position of the child's head brings its long diameter in the right oblique diameter of the pelvis, and therefore the base of the wedge is to the front. Whatever may be the etiology, the left laceration is more frequent, and is commonly deeper than that which occurs on the right side, even when both are present. It is more apt to extend into the vaginal fornix, and laterally into the cellular tissue that separates the peritoneal layers of the broad ligament.

Next in frequency are **the multiple, or stellate lacerations,** though I doubt whether these ever occur, unless under very exceptional conditions of instrumental delivery, as the result of a single parturition; the multiple lacerated cervix is more probably the consequence of repeated parturient dilatations of an unhealthy cervix, a cervix that has lost its elasticity, and therefore cannot co-operate with the expelling power of the uterus.

Stellate lacerations are more numerous in the anterior, than in the posterior lip of the cervix. There is no structural reason for this, but the anterior lip is somewhat longer than the posterior, and the common position of the child's head, which brings the thicker end of the wedge against the anterior aspect of the lower segment of the uterus, may be a factor in producing multiple lacerations, as it is in determining in favor of left lateral lacerations.

The symptoms of lacerated cervix, are local, and remote. The former will include the tear, and the tissue changes that have developed because of it; the latter recognizes any remote conditions that may be caused by the laceration, or by conditions growing out of it.

The local symptoms of a lacerated cervix are primary, and secondary. The **primary symptom** is a tear, which as we have seen, may be single or multiple. When uni-lateral, or bi-lateral, it

usually involves the entire thickness of the cervix, extending from the external os, with varying depths, even to the internal os, in exceptional instances. The stellate lacerations are not so deep, involving only a part of the portio vaginalis. In rare instances the inner structures of the canal, that is the cervical mucosa, and a certain depth of its retro-mucosa yield, without involving the outer structures, which are covered by a continuation of the vaginal mucous membrane. This condition presents no appearance of laceration, but the examining finger is easily admitted into the cervical canal, and the injury may thus be detected without difficulty. This laceration is lateral, and may extend from the internal to the external os without giving outward signs of its existence. Healing is accomplished by an extension of the mucosa of the canal over the torn surfaces. This laceration may escape detection, and herein lies its danger, especially if the tear is in the vicinity of the uterine attachment of the broad ligament. Opening this space exposes a surface very favorable for the absorption of septic organisms, which because of the comparatively small os, collect in the cavity of the cervix, and there remain as a continual source of infection.

The **secondary local symptoms** depend in great measure upon the septic, or aseptic healing of the laceration. A slight laceration is quite compatible with a normal delivery, and heals without in any way disturbing the life history of the uterus, if the conditions for repair are aseptic. The same is true of deeper lacerations; union by first intention takes place, and the canal is restored to its functionating activity. If, however, the vagina is not aseptic at the time of labor, or if it ceases to become so before healing has progressed sufficiently to resist pathological micro-organisms, healing by granulation takes place, and there is present the hyper-nourished cell, the excessive formation of tissue elements, and at best a wide gaping fissure.

Even this condition in an otherwise healthy woman, with a healthy involuted uterus, is not necessarily attended with evil consequences. But given a lacerated cervix that has healed by granulation—which generally signifies infection—and a sub-

involuted uterus, a set of local symptoms is certain to follow. The inflammation that attends healing by granulation excites the cervical glands to abnormal activity. They secrete unduly, and soon become hypertrophied. The same inflammation extending to the cervical mucosa develops an endocervicitis, which by easy steps of progress upwards into the body of the uterus, results in an endometritis.

The lower segment of the uterus is the anatomical support of the uterine mucosa. Destruction of the integrity of the canal favors congestion of the mucosa, and this leads to thickening, and finally to ectropion of the cervical mucous membrane. A heavy subinvoluted uterus not caused by laceration, but the result of the pelvic inflammation that set the course of the cervical tear, or of inflammation arising from other causes, forces the organ down into the vagina, and the torn uterine cervix with its everted mucous membrane backwards against the posterior vaginal walls. The friction of the exposed cervical mucous membrane against the mucous membrane of the vagina, plus a more or less irritating discharge from the cervical and vaginal glands, results in granular erosion of the cervix, with its possible consequences, which are among the gravest in the pathological histogenesis of the uterus.

The eroded mucous membrane secretes a muco-purulent fluid, *cervical catarrh*, that fills the opening of the canal, and adheres to the eroded surface. This discharge varies within wide limits as to quantity, but possesses the characteristics of catarrh from any other mucous membrane, the initial process of which is one of degenerated tissue.

The relation between a lacerated cervix, and the development *in loco* **of malignant disease,** sarcoma, and carcinoma, is probably one of prolonged irritation, whereby the embryonic and undifferentiated cells are excited to an activity not in harmony with their environment, or in conformity with the general well being of the organism. Such secondary local developments pass on into the division of neoplasms. In many instances, especially the adenomata, and some forms of epithelioma, there is ample evidence that the initial process is an erosion of the cervical mucous membrane. But this question will be more fully discussed in *Chapter X*.

The remote symptoms of a lacerated cervix are not numerous; the conditions having their genesis in causes active at the time of the laceration—septic—which are effective, and developed because of the local injury, give rise to many symptoms. The laceration alone is of little consequence, the pelvic inflammation—*pelvic cellulitis*—which may develop by reason of the tear in the cervix, is far reaching in its effects. To this and not the laceration, are we to look for the neurasthenia, the headaches and backaches, and gastric disturbances that are so frequently associated with a lacerated cervix. These are not due to the cicatricial tissue of the tear, but are caused by restricted action of the pelvic organs, obstruction of the lymph channels, and vascular circulation; by pressure on nerve trunks that are involved in the cellular tissue exudate, by the toxines that are absorbed through the lymphatics and by them carried to remote parts and organs. These conditions are the result of the septic infection of the pelvic cellular tissue, which, because of its importance in gynæcological pathology, and because its etiology is inseparably associated with laceration of the cervix uteri, may with propriety be considered in this place.

Inflammation of the cellular tissue of the pelvis, pelvic cellulitis, is always caused by the presence of septic micro-organisms, and the channel through which these gain entrance into the parametric tissue is so constantly the injured cervix, that we are clinically justified in assuming that when pelvic cellulitis exists, there must have been a lesion of the lower segment of the uterus through which infection took place.

A distinction is to be maintained between pelvic peritonitis, and pelvic cellulitis, the two forms of pelvic inflammation. Both are due to the presence of micro-organisms, but **inflammation of the pelvic peritoneum is probably always secondary to some pre-existing pelvic disease,** as a suppurating Fallopian tube, or an appendicitis, and is, unless of a most virulent type, curative in its nature, for it closes in infected areas, by causing adhesions between adjacent organs, and thus limits the absorption of septic material.

Pelvic cellulitis, on the other hand, is a primary disease, due to the immediate absorption of the specific organism into the cellular tissue of the pelvis.

Pelvic cellulitis is not as often met with as pelvic peritonitis, which is probably more frequently encountered than any other form of inflammation of the pelvis, but infection of the pelvic cellular tissue bears so constant a relation to laceration of the uterine cervix, that it may be considered one of the remote sequela of a cervical tear. I believe it to be **the most common cause of the reflex symptoms that are frequently attributed to the laceration itself.** Pelvic peritonitis having no direct connection with a lacerated cervix, save as it may be caused by pelvic cellulitis, will here be passed over with the brief foregoing mention.

An understanding of pelvic cellulitis—para-metritis—is inseparable from a knowledge of the distribution of the cellular tissue within the pelvis.

The pelvic connective tissue appears as a loose areolar network that surrounds all the pelvic bloodvessels, lymphatics, nerves, and the ureters. It forms a layer of varying thickness between the pelvic organs and the peritoneum, with the exception of the fundus of the uterus, where the peritoneum lies in contact with the external uterine wall. The cellular tissue thus supports and connects all the tissues and organs within the pelvis.

Inferiorly it is limited by the pelvic fascia, a strong aponeurosis that passes from the pelvic walls between the pubic bones, over the levator ani, and coccygeal muscles. Superiorly it is bounded by the peritoneum. Between the two tissues, pelvic fascia and peritoneum, inflammatory action is usually confined; it shows little disposition to pass beyond these anatomical barriers.

Connective tissue is not equally distributed to all parts of the pelvis, its most abundant development being around the supra-vaginal portion of the uterine cervix, along the base of the broad ligaments, and between the bladder and the symphysis pubis. Nor is its development the same in every condition of life. During pregnancy, keeping pace with the increase in size, and the elevation of the gravid uterus, the cellular tissue develops, greatly so that at the termination of gestation, the spaces formerly occupied in the pelvis by the broad ligaments,

which have been drawn up with the uterus, are filled with connective tissue. This fact bears a very close relation to the clinical history of pelvic cellulitis.

Pelvic cellulitis has no other origin than septic infection, and the point of entrance of the micro-organisms into the connective tissue is almost always some form of injury of the uterine cervix. This injury exposes the cellular tissue of the broad ligament to direct absorption, and the lymphatics assume an active part in the spread of the infection. Lymphangitis is usually present, and though the situation of the lumbar and hypogastric glands prevents a demonstration of their actual involvement, from analogy we may conclude that they likewise participate in the morbid process.

The essential injury to the cervix generally occurs during parturition, but it may be the result of mechanical dilatation of the cervix, or any operative procedure that involves the lower segment of the uterus.

Because of the tissue-development that accompanies gestation, as well as the trauma that may occur during the passage of the child through the parturient canal, all the tissues and parts are especially susceptible at that time to the invasion of disease, for the interference with metabolism that attends bruising of tissues, reduces the phagocytic power of the local cells. Hence, the septic infection that follows non-puerperal injuries of the cervix, is not liable to assume the same wide distribution, as that which has its genesis in the lying-in-period.

The micro-organisms that cause pelvic cellulitis, are, either the bacteria that exist normally in the vagina, but are reduced to inactivity by the natural acidity of the vaginal secretion, or bacteria introduced from without—dirty instruments or hands being the usual media of infection.

The history of pelvic cellulitis varies with the initial lesion, as we are led to expect from the anatomical distribution of the pelvic cellular tissue. If the laceration is lateral, the cellular tissue of the base of the corresponding broad ligament will be first invaded. If the lacerations are multiple, the cellular tissue surrounding the supra-vaginal portion of the cervix will be the first to absorb the poison. If, to carry the etiology somewhat

beyond the exact limits of the cervical lesion, the point of invasion is the fundus uteri, the part first attacked is the cellular tissue in the superior portion of the broad ligament in the vicinity of the Fallopian tube, and the round ligament.

Septic inflammation of the pelvic cellular tissue is primarily lateral, not extending beyond the median line. When it develops on both sides of the uterus, surrounding it, and occupying both broad ligaments, the tissues have been invaded from more than a single point, or the lymph channels have carried the essential bacteria from one side to the other, or the layer of tissue, very slight in the non-pregnant uterus, that lies between the cervix and the bladder, has served as a bridge to convey the infection over. Such is more frequently the course of puerperal cellulitis, non-puerperal invasion being generally confined throughout its history to one side of the uterus; we may find that section of the pelvis entirely occupied with cellular infiltration, and even pus, the opposite side remaining free from any evidences of inflammatory exudate.

This behavior of pelvic cellulitis receives an explanation in the anatomical arrangement of the visceral peritoneum, which is firmly attached to the fundus of the uterus, and the rectum, in the median line, permitting no direct communication between the two halves of the pelvis.

The course of septic infection of the pelvic cellular tissue depends upon two factors, the micro-organisms that invade the system, and by passing through their life history set in motion the tissue changes of specific inflammation; and the soil upon which the micro-organisms feed, and without which they cannot develop and grow. There may exist the initial lesion—the lacerated cervix—and the pathogenic cocci, but if the leucocytes of the exposed tissues are sufficiently active to exert their phagocytic properties, or if the system in general is healthy, the septic organisms can make but little headway. Such conditions do not necessarily kill the bacteria, but they are thereby rendered inert, and their virulence greatly modified.

The systemic conditions that exert a powerful influence over the clinical history of exposure of the pelvic cellular tissue to septic infection through a lacerated cervix, are those that in-

terfere with metabolism, with the normal reconstruction and building up of tissues. Among these I would give a first place as of frequent occurrence, to any derangement of the eliminating organs that favors retention of effete material. **The uric acid diathesis** comes within the limits of this definition, for though in this diathesis certain tissues and organs are especially susceptible, and serve as foci for the expenditure of the disturbing action, all parts and tissues are rendered more irritable, more likely under slight provocation to develop inflammation, and less able to resist the invasion of disease.

Even more favorable to the development of micro-organisms in the pelvic cellular tissue than the uric acid diathesis, though of less frequent occurrence, is **tuberculosis.** Aside from tuberculosis of the genitals, which will receive a more detailed description later, (*Chapter IX.*), the general condition manifested in defective tissue formation, defective digestion, and degeneration of primarily formed tissues, predisposes to disease, by reducing the phagocytic power of the leucocytes. This diathesis shows itself also in undue irritability of the tissues, which favors congestion and inflammation. Given these conditions, among others of like nature—**scrofulosis**—the pelvic cellular tissue, through causations that expose it to the invasion of pathological micro-organisms, becomes a favorable soil for their development.

The clinical history of the invasion of the pelvic cellular tissue with septic micro-organisms, is determined, not by the number of the organisms, but more by the special variety of bacteria that becomes active.

Delayed inflammation of the pelvic cellular tissue, when it is observed that the point of infection is a lacerated cervix, delayed suppuration, or absence of pus, receives an explanation in this hypothesis. I am inclined to believe that that rare form of inflammation, **atrophic pelvic cellulitis,** is due to a peculiar, not frequently active micro-cocci, the end of which is to the organization into fibrous tissue and bands, of effused lymph. These bands remain after all other evidences of cellulitis have disappeared, and bind the uterus in abnormal positions. Chronic atrophic cellulitis is generally non-puer-

peral, and may present the features that distinguish it from other forms from its incipiency, having no acute stage, but running a chronic course from the beginning. There is no disposition to suppuration. The cellular tissue is everywhere indurated, and adventitious bands pass from the point at which the disease originates, eventually binding the pelvic organs together with a net-work of fibrous ligaments. These are of great strength, and resist attempts at stretching, by any force that under ordinary circumstances would be considered justifiable.

The most disastrous **results of atrophic pelvic cellulitis,** are expended upon the utero-sacral ligaments. Induration and contraction of these ligaments hold the uterus firmly in dislocation, and interfere seriously with the functional activity of the rectum. This condition when present complicates and increases the difficulties of a vaginal hysterectomy, arresting the delivery of the uterus as it is cut out of the broad ligaments, and detached from the bladder and rectum.

Atrophic pelvic cellulitis is liable to involve the uterus, causing its contraction, and consequent hyper-involution. The uterus gradually grows small, increasing in density. In consequence dysmenorrhœa is attendant in various degrees.

The diagnosis will rest upon the clinical history of pelvic cellulitis following injury of the cervix, usually non-puerperal, and the recognition by bi-manual examination, of unyielding fibrous bands passing in various directions through the pelvis.

The usual course of pelvic cellulitis, both puerperal and non-puerperal, is towards resolution ; if suppuration is to occur, it begins within a few days of the initial symptoms. Such cases follow rapidly upon the infection, that is, within a day or two after delivery, or the operative lesion of the cervix. The cases that develop late in the puerperium do not usually suppurate.

The common history of puerperal pelvic cellulitis is, that the patient does not pass through the ten days or fortnight of the lying-in period satisfactorily. There may be a slight pyrexia, which is erroneously attributed to the establishment of lacta-

tion. The lochia is increased, for involution of the uterus does not keep pace with the constitutional folding-up. Hence the vessels of the endometrium and of the uterus do not contract properly, and while there is no decomposition of tissues, as when the infection proceeds from a retained placenta, the sanguineous discharge continues, and is too profuse.

The patient after the usual period gets about, but in one or two days is obliged to return to her bed, with a rigor, fever, and gastro-intestinal disturbance.

Unless the peritoneum is involved, not common in pelvic cellulitis, pain is usually absent at this stage of the disease. There is more likely to be a sense of discomfort in the lower abdomen, with urinary tenesmus. Constipation is frequent. The tongue is coated, and movements that bring into play the pelvic muscles, increase any discomfort that may be present.

The physical signs are for the first few days rather illy marked, increasing however in definiteness, and are significant only when grouped with the subjective symptoms.

An examination of the vagina at this time, shows the mucosa to be soft, somewhat swollen and puffy, and a general tissue relaxation that spreads to the uterus, to be present. The uterine arteries seem to have increased in size, as well as their smaller branches, which under other circumstances, save when a uterine fibroid is present, or a pregnant uterus, cannot be palpated. The whole vault of the vagina pulsates, and the vagina seems hotter than the thermometric reading would indicate.

Exudation into the cellular tissue has not yet begun, but within forty-eight hours a swelling will be detected at one side of the uterus, in the base of the broad ligament. This rapidly increases, extending upwards and forwards, lifting the peritoneum from the broad ligament and the anterior pelvic wall; involving the cellular tissue that has developed during pregnancy, and the normal ascent of the uterus.

The swelling can now be felt through the abdominal wall above Poupart's ligament. It is of stony hardness—a feature quite diagnostic of pelvic cellulitis—sharply defined in its upper border, and firmly fixed directly under the abdominal

muscles. The exudation is usually unilateral, at least that portion of it that can be palpated through the abdominal walls, because the firm anatomical attachment of the peritoneum to the anterior abdominal wall limits its progress at the median line.

At the same time the exudation may invade the cellular tissue surrounding the supra-vaginal portion of the cervix. We then find the cervix imbedded in a circle, or collar of indurated tissue. Or the morbid process may spread backwards, involving the cellular tissue of the utero-sacral ligaments, and that surrounding the rectum. Unless the peritoneum is involved, there is no swelling in Douglas' pouch, the tumor developing behind, and in connection with the uterus. Examination by the rectum finds the cervix surrounded by a ring of cellular tissue exudate.

Pelvic cellulitis very commonly terminates in absorption, the effusion into the cellular tissue is slowly taken up, and in a period varying from one to three months the swelling has mostly disappeared. There is however liable to be a portion of the exudate that takes on fibrous organization, resulting in cicatricial contraction, permanent dislocation of the uterus, and fixation of other pelvic organs.

Rather exceptionally suppuration takes place. This may begin in the cellular tissue at the base of the broad ligament, and if not extensive, may point at the side of the uterus, but quite as frequently the pus follows the cellular tissue beneath the anterior parietal peritoneum, and points above Poupart's ligament.

The veins of the broad ligament—pampiniform plexus—are intimately associated with the pathology of pelvic cellulitis. They become thrombosed, and phlebitis, with metastatic abscesses are liable to develop. Such infected clots may be the only foci of suppuration, and are best opened through an anterior incision that includes Poupart's ligament. If it becomes necessary to open the broad ligament exudate through the vagina, the two incisions should be joined to insure drainage.

Pain, even after pus has formed, is not a marked symptom of

pelvic cellulitis.   This is because of the elastic and easily distensible character of the tissues involved.   The suffering, unless the peritoneum participates, is more that of soreness, and great sensitiveness, excited by any motion that brings into action the muscles lying in contact with the inflamed areas.

There is nothing typical in the pyrexia of pelvic cellulitis, or that serves to distinguish it from the pulse and temperature of a similar process in any other part of the body. The case is one of septic infection from its incipiency, and as such is characterized by the usual septic pulse and temperature.

Save in the milder cases, the temperature rarely drops to normal, and this only in the morning hours.   Usually it is always a little above the healthy point, rising one, two or three degrees in the evening.   The pulse does not present the usual ratio with the temperature, but is a higher rate than the body heat suggests. When pus forms, the pulse and temperature increase, but not to the same degree that we would anticipate, if pyæmia was not added to septicæmia.   Toxæmia is already present, and therefore the system is not quite as susceptible as it would be if suppuration was the primary source of the infection.

The prognosis of pelvic cellulitis, so far as we have regard to life, is favorable, when not puerperal.   Patients rarely die unless the infection is especially virulent—and then death follows quickly upon the invasion of the system—but the sequelæ of the local pathology frequently lead to chronic invalidism.

A woman after an attack of pelvic cellulitis, whether it proceeds to suppuration or not, is damaged so far as her pelvic organs are concerned. Displacement of the uterus, dysmenorrhœa, sterility, interference with the pelvic lymph and blood circulation, are among the most common results of the organization of inflammatory exudate in the peri-uterine cellular tissue.   Nerves become included in the cicatricial tissue, and hence follows disturbance of digestion from impaired innervation.   If there is present an inherited neuropathic tendency, these altered conditions in the pelvic contents may act as exciting causes of neurasthenia.   This I consider the only relation between a lacerated cervix and neurasthenia.   The tear

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in the cervix is alone powerless to cause defective general nutrition, which manifests itself in badly nourished, and imperfectly acting nerve centers. There must be a predisposition, inherited or acquired; the latter frequently obtains as a result of modern social conditions, and the lacerated cervix is nothing more than a coincidence in the chain of etiological factors.

The treatment of pelvic cellulitis will be prophylactic, and of the condition when fully developed.

The prophylactic treatment relates in the first place to maintaining the most absolute asepsis in all manipulations involving the genital organs, and especially those that have to do with the cervix uteri. Of this mention has already been made when speaking of the preparations for gynæcological examinations, and the present opportunity is used to emphasize the necessity of attention to the smallest details, and to enjoin the utmost gentleness in conducting all gynæcic manipulations. The latter cannot be too forcibly insisted upon, especially when instruments are used to assist in the examination. A slight abrasion of the cervical mucous membrane, will be quite sufficient to serve as a point of entrance for pathological microorganisms. Such injuries attend the use of the uterine sound, and especially the injudicious and unskillful use of dilating instruments.

Many cases of ill health that follow gynæcological examinations, or slight operations on the uterine cervix, are directly traceable to an unsuspected lesion of the mucosa, and absorption of septic material. Such lesions are almost more dangerous than an operative wound, even though the latter may be more extensive. For this reason attention to the details of preparation and manipulation should be most carefully planned.

Prophylactic treatment applied to operations involving the cervix, is concerned with leaving no surface uncovered with mucous membrane; that is, the underlying cellular tissue through which absorption takes place, must not be left exposed; perfect coaptation should be sought, and accomplished. By such means we go far towards preventing post-operative pelvic cellulitis.

The treatment of fully developed pelvic cellulitis will be successful, in proportion as we limit the absorption of the septic material, and combat toxæmia. The former is commonly limited by natural anatomical construction; the latter is more especially the result of absorption from central pus formations—venous thrombosis—and is rarely due to the primary infection.

Local measures will consist in aseptic douching, of course with no anticipation thereby of reaching the exudate, but rather of preventing further absorption by maintaining a clean vagina. For this purpose I prefer *Creoline, one per cent.,* or *one-half of one per cent. solution. Bichloride of Mercury* is a favorite douche, $\frac{1}{2000}$. My objection to *Mercury* is the unsuspecting susceptibility that some persons show to this drug, and the destruction of the epithelial layers that frequently attends its continued use. *Creoline* possesses none of these disadvantages. It is antiseptic, and at the same time very soothing to the mucous membrane of the vagina. *Carbolic acid,* $\frac{1}{80}$, is also useful.

In addition to the Creoline douche, which should not be repeated oftener than every twelve hours, the exudate will be arrested and reduced by availing ourselves of the hygroscopic action of *Glycerine.* Following each douche, I place a cotton-wool tampon, well saturated with sterile five per cent. solution of Glycerine and Creoline, in the vaginal fornix. My experience leads me to believe that the cases of pelvic cellulitis in which I have consistently followed out this treatment have been less severe, and attended with less extensive exudation into the cellular tissues than those in the treatment of which I have depended upon douching alone.

Hygiene will consist in absolute rest in bed. The diet should be light, but highly nutritious. All functions should be maintained, and each organ encouraged to perform its utmost duty.

Unless the case proceeds to general septic intoxication, or there are evidences of peritoneal involvement, no good end can be accomplished by maintaining free catharsis by means of salines. On the other hand, constipation is to be guarded against, for any condition that favors congestion of the pelvic circulation will retard recovery, and interfere with the degree of metabolism that is an essential part of health.

An occasional dose of *Merc. dulc.*, *1x.*, or *Calomel and soda*, one grain, in divided doses, will in the majority of instances be sufficient. More drastic measures may be necessary, but they are to be avoided, as inconsistent with the rest essential to cure, and should be reserved for the more desperate cases.

Internal remedies will, I think, accomplish little in pelvic cellulitis, save as they are able to maintain the balance between waste and repair, and thus remove a possible field for the propagation of micro-organisms.

The fever is liable to be of the *Veratrum viride* type, and therefore this remedy is frequently called for. *Bryonia* as acting especially on cellular tissue, may be indicated. *Rhus tox.* also has its field of action. When suppuration is threatened, *Silicea* would be of avail. Silicea in potentized form will certainly control suppuration, and is of assistance in the absorption of exudate that has already formed. The possession of this power must be by virtue of a destructive action upon the specific organisms that cause the suppuration, or upon the pus cells, or upon the tissues in which suppuration takes place, unfitting them for the completion of the life cycle of the septic cocci. Such being the case, should we not make the exhibition of Silicea an early feature of the treatment of cellulitis, before there is a suspicion of the presence of pus?

From other of the tissue remedies we may expect more positive results. *Kali mur.*, because of its relation to fibrin, and fibrinous exudation, is especially suited to the treatment of the exudate of pelvic cellulitis. The conditions calling for the use of this salt exist prior to suppuration, when the characteristic hardness of pelvic cellulitis is present. It will assist in absorbing the exudate, but there are no data to show that it will prevent suppuration. Collateral indications are, a white and gray coating at the base of the tongue, with involvement of the inguinal glands.

Further indications for use of the tissue remedies in pelvic, and uterine inflammation, will be found in *Chapter VIII.*

The philosophy upon which is based the usefulness of *Hepar sulph.* in suppuration, I fail to understand, or appreciate. In this connection its action lies in the direction of "maturing

the suppurating focus," "bringing it to a head." Now suppuration is attended with danger in proportion to the location of the pus, the quantity formed, and the period of its continuance. Why then should we give a remedy that will increase all these conditions? If pus is present, is it the part of wisdom, or of scientific treatment to favor its formation? Do we serve any useful purpose by increasing the destruction of tissue, and assisting in the conditions that encourage absorption? What does maturing an abscess mean? What significance has the pointing process? A continued action of the septic organisms, the very thing it is our desire to prevent, increase of pus, destruction of tissue in the direction of the least resistance, and further exposure of the system to septic intoxication.

Comparatively few cases of pelvic cellulitis proceed to suppuration, through suppurating **venous thrombosis** is not rare, they usually terminate in resolution, or a permanent tissue organization. When suppuration takes place, **the most common situation for the abscess to point,** that is to approach the surface, is above Poupart's ligament. The swelling that appears there as a mass of stony hardness, loses this characteristic feature, and softens, two clinical features extremely suspicious of suppurating pelvic cellulitis. It will be remembered that the swelling in this situation from this cause, is extra-peritoneal, being confined to the pelvic connective tissue outside of the parietal peritoneum. But slight danger attends the opening of such collections of pus, and I therefore consider it good practice to cut into the cellular tissue exudate as soon as there is evidence of softening, if pulse, temperature, and gastro-intestinal symptoms indicate suppuration.

Quite rarely the pus points at the side of the uterus, in the base of the broad ligament. As soon as discovered, the pus should be evacuated. **Drainage is always advisable;** the healing of the cavity will be hastened if its entire inside is curetted, and before the drainage is placed, swabbed out with carbolic acid, or tincture of Iodine. Phlebitic veins will be aspirated and emptied, whenever found.

The Preparatory Treatment of Laceration of the Uterine Cervix, will be

determined by the pathology of the tissues in which the laceration exists.   There is commonly present in greater or less degree, a cervicitis, with erosion and ectropion of the cervical mucosa, and cervical catarrh.   If the case is of long standing, there will be in addition hypertrophy, and consequent increased activity of the cervical glands.   Any attempt to restore the continuity of the torn cervix—and the treatment of the laceration *per se* can have no other meaning than operation,—must be entirely futile, until the conditions that coexist with the laceration are removed.   **The tissues must be made healthy, and congestion, and hyperplastic growth relieved before any operation can be successful,** for it is clearly demonstrated that we attack a lacerated cervix from the wrong direction, if, in the expectation of curing the pathology of the cervix, we first operate on the laceration. Such treatment must fail, for the unhealthy tissue will not heal.   Our first consideration therefore will be to treat whatever pathology exists in the lower segment of the uterus, and then decide whether or not an operation is called for. 'Sometimes removal of these conditions, with support of the uterus and attention to pe vic hygiene, will render an expected operation unnecessary.

The treatment of cervicitis in its various forms, under which may be classed the preparatory treatment of lacerated cervix, will receive attention in *Chapter VIII.* "*Inflammation and Hyperplasia of the Uterine Cervix,*"   In this place the operative treatment only will be discussed.

Assuming that the only treatment for a lacerated cervix, if the removal of the local pathology fails to bring about a cure, is an operation, we have to inquire, *first,* what class of cases require operation; and *second,* when should the operation be performed? The extent of the tear will not always serve to indicate the necessity for the operation, it being a matter of record that many cases of multiple and deep lacerations give rise to no symptoms.

Two considerations weigh in favor of operative treatment; the state of the cervical mucosa, and the future possibility of the development of malignant disease.

Lacerated cervix and inflammation of the cervical mucous

membrane, stand to each other almost in the relation of cause and effect, and therefore if the two co-exist, a permanent cure cannot be effected without removal of the cause. I say, permanent cure, for the improvement following the local treatment necessary to prepare the parts for operation, may be only temporary, and does not insure against a return of the disease. Therefore, if for causes not always ascertainable, the tear in the lower segment of the uterus is followed by inflammation of the mucosa, with its resulting erosion, ectropion, and hyperplasia, an operation looking to the restoration of the cervical canal, or possibly the removal of the entire diseased area, will in the majority of instances be called for. Some cases, as we have said, will, after treatment, present a sufficiently healthy appearance to justify delaying operative measures, but they are not among the majority that come to the surgeon for relief from suffering.

Having regard to the future, we must recognize the very intimate relation between the cervicitis that develops in a lacerated cervix, and epithelioma of the lower segment of the uterus. This consideration alone, would seem to justify overzeal in operating; to warrant resorting to radical measures, to avoid even a possible danger of malignant development.

On the other hand, a laceration that has healed over without cervical degeneration, without prolapsus of the mucosa, and unaccompanied with evidences of defective nutrition, furnishes no indication for an operation, and should not be interfered with unless some symptoms that can without doubt be referred to the involvement of nerve fibers in the cicatricial tissue, are present.

A consideration of **the most favorable time for operating on a lacerated cervix** will deal with the question of **mediate, or immediate operation;** whether the best ends are served by operating early in the lying-in state, if the case is parturient, or by waiting until the period of uterine involution has been completed, or later, until the laceration proves itself to be a positive pathological factor.

In favor of the immediate operation, either at the time of confinement, or within the first forty-eight hours, it may be said that

if successful, it terminates the life history of the lacerated cervix, and its sequela. It is the ideal treatment, for it is in the line of aseptic surgery. But while theoretically it recommends itself, practically there is not much to encourage us in performing an early trachelorraphy. The condition of the uterus at the time of the expulsion of the child is one of extreme relaxation, the first step in the process of involution that terminates the lying-in period. The changes that naturally take place at this time are not concerned with repair, but have to do with absorption, the folding up of tissues, and the removal of the hyperplasia that has prepared the uterus for the final step of parturition.

At the time of delivery and for a fortnight following, the extent of the laceration, the healthy tissues, and the tissues that are beyond repair, cannot with certainty be distinguished, so that it becomes a matter of great difficulty, if not impossibility, to place the sutures in tissues that will hold, and thus to obtain good union. Until involution is completed or well on the way to completion, operations on the uterine cervix deal with tissues that are not surgically favorable for repair. Moreover, suturing a lacerated cervix is necessarily followed by at least a temporary constriction of the cervical canal, which will interfere with the flow of the lochia, the natural drainage of the uterus after child-birth, thus favoring the retention of effete material within the uterus.

But few surgeons report success in the immediate repair of the lacerated cervix. So uncertain are the results, that it does not seem wise to subject the patient, whose strength has been already severely taxed, to the additional shock of an operation that requires an anæsthetic, surgical skill, and time for its performance.

The time of election for the repair of a lacerated cervix is when involution of the uterus has been accomplished, and the reproductive organs have assumed their normal anti-pregnant state. To this end every puerperal woman should be examined before she is dismissed from the obstetrician's hands. The extent and degree of the injury can then be ascertained, and the future treatment outlined. If pelvic cellulitis proves a

factor to be reckoned with, no operation looking to repair should be considered until absorption of the exudate has been accomplished, or it has passed into the state of innocuous quiescence.

A history of pelvic cellulitis, more especially if there has been a suspicion of suppuration, would serve as an additional caution against too early an operation. This condition might entirely counterindicate an operation when all else pointed to its necessity, for if pus is present in the pelvis, either in the peri-uterine tissue, the ovary or the Fallopian tube, the necessary manipulation attendant upon a cervical operation would easily rupture the abscess cavity. A laparotomy would then be secondary to the repair of the lacerated cervix; but danger lurks in the fact that the rupture of the abscess does not at once make itself manifest, and may assume dangerous proportions before the remedial operation is suggested.

Two principal procedures for the surgical treatment of a lacerated cervix, are presented for consideration. The restoration of the integrity of the cervical canal by means taken to unite the tear; and the removal of all tissues in front of the superior angle of the laceration. The latter operation differs only in extent, and but slightly in detail, from amputation of the cervix for conditions not necessarily associated with a lacerated cervix. The description of this operation, therefore, will be in connection with the treatment of the diseases for which it is especially appropriate. (*Inflammation and Hyperplasia of the Uterine Cervix.*)

Trachelorraphy, the term used to designate sewing together the lacerated uterine cervix, with its various modifications, and technique, is based upon the original operation of Dr. T. A. Emmet, who enthusiastically proclaimed for it a permanent position among gynæcological operations. Since the original operation, the technique has been much simplified, as are all perfected manipulations. The former special instruments are not so much used, and the etiological importance of the pathology of the lacerated cervix, is restricted within narrower limits.

The "*cicatricial plug,*" an important feature of the early

pathology and operation, assumes not so important a role as formerly, for it now seems doubtful whether the reflex symptoms that have been attributed to the constriction of nerve filaments in the scar tissue, have such an origin; rather are we inclined to attribute more to infection, peri-uterine cellulitis, and exudation. Cicatricial tissue in the uterine cervix, as elsewhere, is not favorable for surgical union, and therefore must be removed, but it is doubtful whether, its presence possesses other significance than that connected with the healing of the lacerated surfaces.

The technique of trachelorraphy, is simple. Like all other operations involving the lower segment of the uterus, the most perfect asepsis is essential to success.

The position of the patient is a matter of individual preference. The dorsal decubitis possesses the advantage over other positions, of involving a minimum degree of strain on the patient, affording a more natural position of the parts to be operated on, and at the same time contributing to the convenience of the operator.

When possible to obtain the number of assistants, it is better to entrust a leg to each assistant, rather than to use a crutch to maintain extreme flexion of the thigh on the abdomen. Especially do we appreciate this advantage in very fleshy patients, or those in whom the thighs are large. With the crutch the sacrum is raised from the table, and the vagina made to curve upwards. The necessary depression of the perineum is thus made difficult. Assistants are able to flex the thighs on the abdomen, and rotate them outwards without raising the perineum. One other assistant to hold the vaginal retractor, and to sponge, with the sponge nurse, and the instrument nurse, who can also attend to the irrigator, are all that will be required to assist at the operation.

In this place let me urge **the advantages of a skilled anæsthetist.** A specialist should always be employed when possible. Not only is the benefit to the patient inestimable, but it leaves the surgeon at liberty to devote himself to his work, without concern as to the condition of the patient.

As in all other operations, I handle my own instruments.

This economizes time, for the operator can think more rapidly than he can call for an instrument, and it also places the instrument table more completely under his control. The instruments are arranged on a low table, within easy reach of the right hand of the surgeon.

The instruments necessary are:

One pair of short, slender scissors, sharp pointed, slightly curved on the flat. (Ostrom.)

One pair of short needle holders.

Two pairs of volsella. (Ostrom.)

One dozen short strong needles.

One uterine dilator. (Goodell.)

One intra-uterine catheter.

One uterine sound.

Six artery clips, sharp pointed.

One dull curette.

One sharp curette.

One scalpel. (Ostrom.) Perineal Retractors. (Martin.)

A preliminary curettement is commonly advisable. This properly belongs to the treatment that prepares the cervix for operation, but if the curettement has not been done, and at the time of the trachelorraphy the endometrium is found inflamed, the body of the uterus should be scraped out as the first step towards sewing up the cervix.

The intra-uterine condition most frequently encountered at this time is chronic endometritis, associated with subinvolution. For the removal of the chronically inflamed endometrium the dull curette is the safer instrument. It causes less mutilation than the sharp blade, and is quite as effective in cleaning the uterine cavity.

After a thorough irrigation of the vagina, first with bichloride of mercury, $\frac{1}{2000}$, followed with normal salt solution, the cervix is exposed by retracting the perineum, and the vagina and cervix cleansed with acidulated alcohol. (*Gynæcological asepsis.*)

The cervix is steadied with a volsellum and then slowly dilated. The external os presents no difficulties in this manœuvre, but the internal os yields less readily. The dilata-

tion must however be continued until the curette passes into the uterus without difficulty.

The curettement should proceed systematically. The fundus is gone over first, then the walls of the uterus are raked down until firm tissue is felt beneath the instrument. The cavity is then irrigated with salt solution. If oozing is troublesome— usually the uterus begins to contract at once under the stimulation of the curettement—I have found swabbing out the cavity with iodoform gauze twisted on a sound, or long dressing forceps, to be quite sufficient to close the small vessels.

The extent and number of lacerations, will determine the next step of the operation. If the cervix is occupied with stellate lacerations, it is not advisable to attempt to denude and unite all of them. It is better to remove a ring of tissue, limited by the depth of the lacerations. This is not an amputation of the cervix, but removal of only that portion of it that is situated below the angle of laceration.

The anterior and posterior lips of the uterus are seized with separate volsella, and the organ drawn down, and held firmly. The volsella are so inserted as to mark the limit of the tissue in the form of a wedge, that is to be removed. With a scalpel, the inner boundary of the ring is formed. By bringing together in the left hand the handles of the volsella, the other boundary of the ring is formed by encircling the cervix just beyond the base of the deepest laceration. The inner incision—made first—and the outer incision—made last—are then joined in such manner as to form a cone, the apex of which is pointed towards the uterine body.

The cervical and vaginal mucous membranes will then be united. The obstacle to perfect healing will be the puckering that follows an attempt to fit the more extensive outer mucous membrane, to that which lines the cervical canal. To in a measure obviate this, it will be found convenient to fix the anterior and posterior mucosa, both vaginal and cervical, with a single suture passing across the cervical canal. The same procedure, passing from side to side, picking up both mucosa in its passing, fixes the tissues to be united laterally. These two sutures should be long enough to make four sutures when

cut in the median line as they pass across the cervical canal. When these sutures are tied it will be found that the two edges of mucous membrane in the four quarters between the primary sutures, can be united without unsightly puckering. None of the sutures should be buried in the uterine tissue, but should be made to pass across the bottom of the wound; that is to say, the mucous membrane of the vagina and the cervical canal are to be united over the cut cervical tissue. For sutures I prefer a No. 2 chromic catgut, so prepared as to remain unabsorbed for at least two weeks. To obtain union, a shorter period than this is not satisfactory.

The operation for lateral, or bilateral laceration of the uterine cervix, consists essentially in paring and uniting the edges of the tear, thus restoring the integrity of the cervical canal. The tissue to be removed is the newly formed granulation tissue, or if the laceration is of long standing, the structures that have been constructed out of the granulation tissue, for it will be remembered that the cases requiring operation have healed by granulation, not by first intention.

In preparing the edges of the laceration for union, the surface denuded should not encroach unduly upon the vaginal mucous membrane, or the outer aspect of the portio-vaginalis. This is a common error, and one that has to do with post-operative stenosis of the cervical canal, and the elongated conical cervix that not infrequently follows trachelorraphy. The tissue denuded should have a perfectly smooth surface, extending from where it is proposed to form an external os, to a point sufficiently above the laceration to insure removal of all scar tissue; and from the line of the reconstructed cervical canal, to where the cervical mucous membrane passes into the vaginal mucous membrane. This line is not difficult of detection, especially if there has been a cervicitis, or erosion of the cervix. Even after this has been cured, the mucosa covering the tear will appear deeper in color, and slightly granular, and will seem to be continuous with that lining the cervical canal.

If the laceration is very deep, extending to the base of the broad ligament, even to the internal os, it **may be necessary to ligate the uterine artery as a preliminary step to the denudation.** I

have never been obliged to do this, having always been able to control oozing by pressure, or traction on the uterus, and by placing the sutures.

To steady the uterus and bring it into the operative field, I use my small curved volsellum. The guy-roap possesses no advantage over this instrument, and offers the disadvantages that it cannot be removed, and readjusted at pleasure.

The surface of the laceration is conveniently removed with scissors, short, strong and pointed, curved on the flat, and cutting well to the point.

If the tissue to be removed is accurately judged, only a single incision is necessary for each side of the laceration, the two incisions meeting at the superior angle of the tear; thus the tissue is removed in a single mass.

Healing will depend in a great measure upon the suturing of the wound. The needle should be stout, round, slightly curved near the trocar point, with a large eye, and of length to suit the tissues it is intended to penetrate. Needles of this description, of varying lengths, should be at hand ready for use.

If the perineum is repaired at the same time that the cervix is operated upon, absorbable sutures are preferable, for to remove any non-absorbable material a dangerous tension of the perineum is unavoidable, and usually entails a considerable degree of suffering, and probable tearing of the newly constructed tissues.

For the absorbable sutures chromic catgut forms a satisfactory material. For the non-absorbable sutures, iron-dyed, silk-worm gut leaves little to be desired. Silver wire has much in its favor, but is difficult of insertion. No method yet devised has completely overcome the obstruction at the eye of the needle, or when mediately threaded, where joined to the leader.

The first suture should be placed several lines above the angle of the laceration, and the point of the needle introduced in the vaginal mucous membrane a quarter of an inch outside of the line of denudation. The point is made to emerge, not in the cervical canal, but just outside of its mucosa, after the

manner of setting subcuticular sutures. The same process in the reverse order is followed on the opposite side of the cervix. The other sutures are introduced in like manner, but should not be placed too close together; an ordinary laceration will not require more than four sutures.

The advantages of not including the cervical mucosa in the sutures are apparent. Infection from a possible intra-uterine source is minimized, and rolling in of the mucous membrane between the sutured surfaces is prevented, thus making it possible to hold the incised surfaces in contact.

Unnecessary tension should be avoided in tying the sutures. More or less swelling will follow the operation, and if the sutures are tied without regard to this, strangulation of tissues may follow at a period when hypernutrition is essential to successful repair. The surfaces are brought firmly in apposition, but no indentation should be observed.

The absorbable sutures may be cut short, but to facilitate removal of the silk-worm, it is well to leave them long, and tie those of each side together. Thus the bundles formed can be used to dislocate and steady the uterus during the removal of the separate sutures.

If curettement has formed part of the trachelorraphy, especially if the operation has been for a bilateral laceration, which at least temporarily narrows the canal, and to that extent retards drainage, and emptying the uterus, **artificial drainage must be provided for,** and this is best done by lightly packing the uterus with iodoform gauze, making the portion of the strip that occupies the cervix a "cigarette" drain, by passing a piece of gutta-percha about it before it is introduced. This will prevent adhesion of the gauze to the operative field, and render the removal of the drain within twenty-four hours, easy and painless.

At the completion of the operation, it is important to replace the uterus, and to maintain it in accurate position until the ligaments and structures that have been stretched during the dislocation have had time to recover. For this purpose the vagina may be packed with iodoform gauze, observing care to hold the cervix in its proper axis to the body of the uterus,

by packing the anterior and posterior cul-de-sacs firmly with strips of gauze.

The after-treatment of trachelorraphy will extend over a longer period than the gravity of the operation would at first suggest. The same is true of any operation requiring for its performance forcible drawing down of the uterus, and hence mechanical violence done to the uterine supports. There is thus included in the after-treatment of operations for a lacerated cervix, attention to the surgical disease, and the determining of the period of convalescence.

In general it may be said, that **a patient after an operation should be allowed to occupy any position that affords rest, and comfort.** An enforced position, formulated according to some theory of the operator, may entail both nervous and physical suffering that are injurious, and quite unnecessary. Because of the tendency of the uterus to retroflexion, the dorsal position is perhaps the least desirable of any that the patient can assume, but we may reasonably infer that the sensitive and strained tissues will signify any additional tension put upon them, and therefore that the position that is the most comfortable, even though on the back, will be that which retains the uterus in the pelvic relations best calculated for a permanently normal position.

A full bladder adds greatly to the discomfort after any gynæcological operation, and frequently the patient is unable to void her urine naturally the first time, even if subsequent emptying of the bladder is accomplished without mechanical assistance. The slight congestion of the kidneys coincident with the anæsthetic, as well as the usual but unnecessary depriving of patients of water before the operation, reduces the quantity of urine for the first twenty-four hours. It is therefore rarely necessary unless the patient urges, to disturb the bladder within eight hours after the operation. If she can then void her urine naturally, it is well to allow her to do so; if she cannot, even though there is no desire, it is well to catheterize.

Too much stress cannot be laid on the necessity for the strictest attention to aseptic detail in the management of the catheter, and its use. **Operations upon the uterus and the vagina seem to develop an especial susceptibility to cystitis,** and errors in the

technique of catheterization are almost certain to be followed by infection of the bladder. Nor can we overestimate the skill and gentleness essential to the use of the catheter. Fissure of the urethra, irritable urethra, and even urethral caruncula, have been known to follow the ungentle and unskillful use of the catheter. While theoretically a nurse should be able to introduce the catheter without exposing the patient, practically this is not always possible, and the attempt to do so may lead to unnecessary trauma.

Not infrequently through nervous communication with the branches that supply the bladder and the urethra, **there is after operations on the uterus and vagina, induced a spasm of the neck of the bladder,** which without any attendant inflammation gives rise to a condition very similar to cystitis, from which however it is distinguished by an examination of the urine, which gives no evidence of inflammation of the bladder. This condition— *pseudo cystitis*—is liable to develop several days after the operation, and quite frequently when the catheter has not been used. It is difficult to control, and can be successfully treated only with due regard to its nervous origin. (*Post Operative Treatment.*)

After the first catheterization the urine is generally voided naturally, but if not, the bladder should be emptied at least every eight hours.

The uterine drain, and necessarily the vaginal, should be removed the day following the operation, a douche of *Boracic acid*, or *Creoline* given, and the vaginal packing reapplied. The second dressing can remain in place for two or three days if there is not much drainage, but the vagina should be douched each night and morning. At the end of ten days or two weeks, the packing may be dispensed with. The silkworm-gut sutures are then removed; the catgut will require no attention.

To remove the non-absorbable stitches, it is neither necessary, nor advisable to again dislocate the uterus. With the patient in the dorsal position, and with a bivalve speculum that freely exposes the os, the sutures come easily into view. By drawing slightly on the bundle it is desired to remove, we will say

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those on the right side, the points of insertion are made evident, and the sutures one by one cut without untying the knot that binds them together. This method insures against the possibility of overlooking any sutures.

Commonly the wound will be found healed by first intention, and will require no further attention than the daily douche; but should the line of union between the lacerated surfaces not be perfect, the parts may be dusted with *Aristol*, or *Zinc oxide*, or touched with the *Nitrate of silver*.

Occasionally though the wound is surgically perfect, the cervix remains large, and congested. There is more or less cellulitis which is either a continuation of the condition that obtained prior to the operation, or a result of the reparative process coincident with the healing. A few glycerine tampons are usually sufficient to reduce the cervix to its normal size, but if this treatment does not prove effective, *Glycerole of Belladonna* may be added to the local medication, or if the os remains highly congested, and dark from venous stasis, *Hamamelis*, or *Hydrastis* will be found of use. A few drops of the *Balsam of Peru*, may be added to the glycerine tampon.

With the healing of the wound, the surgical part of the after treatment of lacerated cervix, is completed, but **the period of convalescence** does not end here. This should extend over at least six weeks from the time of the operation, past one menstruation—not the flow that sometimes is induced out of time by the operation,—and if this first menstruation is abnormal, if too profuse, or if it lasts too long, or is painful, the second period should come within that of convalescence. It is safe to keep patients in bed until the first menstruation is over. This period may anticipate, or it may delay from some disturbance of the nerve centers, nervous shock not made manifest for a varying time after the operation. After menstruation, if the local and general conditions are satisfactory, the patient is allowed to sit up a part of each day, and gradually resume her accustomed duties. During convalescence the patient receives a daily douche. *Creoline*, one per cent., is indicated if the cervix and vagina remain congested, and there has not been a complete absorption of the exudate that at-

tended the reparative process. *Boracic acid*, ʒ 1, in a pint of water, if the glands are unduly active, and there is a bland vaginal catarrh. *Carbolic acid*, $\frac{1}{80}$, if an antiseptic stimulant is called for, with a relaxed vaginal mucosa, and fetid secretion. *Alum pulv.*, ʒ ss., and *Tannic acid*, grs. xx. in a quart of water. *Formalin*, one-half of one per cent. solution, from its well known germicidal properties, is most useful if vaginitis is present, or when the vaginal mucous membrane shows a high degree of congestion. Simple sterilized warm water, is in some cases all that is necessary, when the only object is a cleansing bath.

In reference to **the cleansing douche,** it may be said, that in this connection, as well as under other requirements, it is a purely hygienic measure, called for upon the same grounds that a general bath is considered essential to cleanliness. Especially in married and child bearing women, when the sexual glands are in a state of activity, and the vagina liable to contain the deposits from coitus, the vagina ceases to be self-cleansing, its secretions are liable to become alkaline, thus favoring fermentation, and conditions that generate bacterial life.

The objection urged against a daily douche, that infection is liable to be introduced with the douche tip, can scarcely be regarded seriously, for a like objection might with the same reason be brought against any instrumentation. In virgins the douche is not indicated unless as a part of some other gynæcic treatment, but in married and in childbearing women, the unmedicated cleansing of the vagina can have no other than a healthful action.

The question of future child bearing will be discussed by patients who have been operated on for a lacerated cervix. A certain proportion of cases have been sterile after the operation, whether as a result, or from other causes cannot be determined. There is however no doubt that the operation can be too well done, that the cervical canal can be made too small by an excess of denudation through mistaken zeal to secure healing by presenting a wide surface of union. This will leave a conduit sufficiently large for the menstrual blood to flow out under the relaxing influence of functional activity, but not of sufficient

size for the fertilizing elements to pass in. The operation however if properly performed need in no way interfere with impregnation, and will materially assist in the successful carrying of the child to full term.

The length of time that should intervene between the operation and exposure to impregnation, is one that deeply concerns the health of the patient, and the surgical success of the treatment. No woman should become pregnant under one year, or bear a child in less than two years after the repair of her cervix. The most rapid tissue repair would not insure against tearing apart the line of union, if subjected to the strain of parturition earlier than this. Even small tears are liable to give way, but the more extensive ones are in proportion exposed to this danger. It is the duty of the surgeon to present this issue clearly to both husband and wife, and to represent to them, if they are not willing to be guided by his advice, not only the fruitlessness of the operation, but the actual injury that an operation is liable to inflict upon a woman, who is called upon to undergo gestation and parturition before she has had time to recover nervousl and physically from a surgical procedure.

CHAPTER VIII.

INFLAMMATION AND HYPERPLASIA OF THE UTERINE CERVIX.

In considering the pathology of the lower segment of the uterus we have presented quite different conditions from those we have thus far studied. In order to appreciate my meaning we will clear our conception of any remote influence, constitutional, mechanical, infectious, though each and all of these must enter the complete picture of the disease, and fix our attention upon local cellular changes, and the manner in which local metabolism is accomplished.

In so far as these processes depart from normal tissue construction, and reconstruction, the force of such activity represents a morbid process. At one end of the scale are hyperæmia, congestion, inflammation, processes not necessarily incompatible with health; at the other end are found that large class of pathological new formations, which we group as neoplasms, benign and malignant, incompatible with health, and destructive of life. Between the two extremes is every gradation of departure from the organic plan that makes for health.

As we would be led to expect from the structural and physiological differences between the lower segment, and the body of the uterus, the pathology of the uterine cervix is distinctive, and while some conditions are common to the entire organ, or may invade one part from another, the cervix is the seat of diseases that rarely if ever affect the body of the uterus, that remain throughout their history confined to the seat of origin, or later become disseminated in other organs, in preference to the contiguous uterine body.

At the risk of the charge of repetition, let us briefly refer to the anatomy of the lower segment of the uterus.

The walls of the canal are composed chiefly of connective tissue through which are irregularly scattered muscular fibers.

A single layer of epithelium extends from the internal to the external os. The layer is arranged in recesses, into which open numerous racemose mucous glands. The vaginal portion of the cervix is covered with squamous epithelium, devoid of mucous follicles. **At the external os there is a transition from squamous to columnar epithelium.** The supra-vaginal portion of the cervix rests in a bed of connective tissue, laterally, in that which goes to make up the broad ligaments. The lymphatics are numerous, being closely associated with those of the upper part of the vagina. They empty into the iliac glands. The arterial supply is through the internal iliac artery. The venous supply is complicated. The channels communicate freely with each other, and in common with other pelvic veins are destitute of valves. In the folds of the broad ligament are several large branches—pampini form plexus,—into which the venous blood from the cervix empty. The innervation of the uterus is by means of the hypogastric branches, but the cervix is less well supplied with nerves than the body of the uterus.

These structural memorabilia will serve to make plain the pathology of inflammation of the lower segment of the uterus. **Any one, or all of the structures of the uterine cervix may become inflamed,** but it is doubtful whether the cellular tissue of the canal is ever primarily attacked, unless directly infected through a local lesion; it is commonly by extension from general metritis, the inflammation spreading from the cervical mucosa, or from the mucosa of the vagina.

The mucous membrane of the cervical canal is the most frequent source of inflammation of the lower segment of the uterus, and generally the process, as long as it continues progressive, that is, while its tendency is to produce cells similar to the local cells, remains confined to that structure, and its accessories, the racemose glands. Clinically, therefore, the form of inflammation of the cervix that, almost to the exclusion of other possible tissue involvement, presents for treatment, is inflammation of the cervical mucosa, *endo-cervicitis.*

Inflammation of the uterine cervix shows certain characteristics that serve to distinguish it from inflammation in other organs, or even inflammation in other parts of the same organ.

Suppuration rarely forms any part of the process. It will be understood that I am not now speaking of infection of the uterus with pus-producing organisms, *septic metritis*, and *cellulitis*. Though the inflammation pursues a chronic course almost from the beginning, the acute phase being rapidly passed over, either the micro-organisms of the cervicitis are not pus producing, or the mucosa serves as a protection for the underlying tissues. Neither does pus form superficially.

It is also to be observed that **inflammation of the cervical endometrium is not a destructive process,** and does not result in ulceration, for we must discard the former pathology of this condition, which included ulceration of the os uteri, inasmuch as recent research shows no true granulations on the mucous surface, and therefore the process does not make for repair, as may frequently be recorded of inflammation.

On the other hand, **endocervicitis is essentially a hyperplastic process,** the affected surface being occupied with a new formation of secreting structures, covered with a layer of epithelium. The pathological interest centers upon an overgrowth and hypertrophy of the cervical glands, which does not involve either destruction or loss of tissue.

Accordingly, **inflammation of the uterine cervix is to be looked upon as a specific inflammation, that manifests itself chiefly in an adenomatous formation of the cervical glands,** which displace the squamous epithelial cells of the portio vaginalis; the apparently raw surface being in fact an entirely newly formed glandular surface, an **adenoma of the cervix.**

With this hypertrophy of the mucous glands of the cervix there is a corresponding activity of the glands themselves. Their natural secretion is increased, and catarrh, varying in character with the degree and stage of glandular enlargement, exists as an essential feature of the disease. So marked and constant a symptom of inflammation of the cervical mucosa is catarrh, that with some clinicians, leucorrhœa, or cervical catarrh, serves to designate the condition. But symptomatology is less trustworthy as a basis for classification than pathology. We cannot with advantage reason from effect to cause, in the study of disease.

Let us fix upon a term that will serve to define and describe what is meant by inflammation of the lower segment of the uterus, as met with in common practice.

Hyperplasia of the cervical glands describes with sufficient accuracy the pathology, if we recognize this as the result of chronic inflammation. From this hyperplasia—adenoma in a restricted sense,—develops the clinical features of **cervical erosion** that will presently engage our attention.

The pathology of hyperplasia of the cervical glands, consists of masses of gland acini that are identical with the local mucous glands. The surface of these masses is thrown in folds and recesses, which being covered with a single layer of columnar epithelial cells, permits the color of the underlying blood-vessels to show through, thus giving a red, raw appearance to the growth. The secreting surface is greatly increased by the recesses and sulci, which vary in shape and size with that of the underneath glandular structures; hence the discharge of mucus is augmented. The simplest glandular construction is followed, but greatly exaggerated. The stroma of the gland is generally of like simple type, showing generally some slight inflammatory exudation.

The entire surface of the adenoma is red and bleeds easily when touched—erosion. This term is misleading, for there is no loss of tissue. The surface unless mechanically irritated is covered with epithelium, thin it is true, but sufficient to protect it unless injured. The term, however, is in such general use that it may advantageously be retained to describe the appearance of hyperplasia of the uterine cervix.

Variations in the method of growth of the hyperplastic glands give rise to differences in the pathology, as well as in the gross appearance. For reasons that are not always to be explained, one or more recesses may become closed at their opening. There is thus formed a cavity in the glandular mass, lined with secreting epithelial cells. The result is, the development of **mucous cysts,** which appear on the surface, or may be deeply situated in the abnormal tissue. These retention cysts vary greatly in size, and number. They cover the eroded surface, looking like grains of sage, and felt

as small tense bodies that can be rolled beneath the finger.
Or only one or two cysts may develop. Their contents is
generally mucus, rarely purulent, and may increase to such an
extent as to rupture the cyst wall by internal pressure, when a
spontaneous cure usually follows.

Other cysts are formed by dilated glandular acini—ovula Nabotha.
These cysts are commonly very numerous, and contain one or
two drops of clear tenacious mucus. They may be situated on
the surface of the erosion, from which they project slightly,
or they occupy the deeper structures of the over-developed
glands. The interstitial tissue of the stroma joins in the gen-
eral hyperplastic process, and the entire cervix becomes en-
larged, resembling **cystic adenoma—cervical cystoma.**

With a rapid increase of glandular hypertrophy, the develop-
ment is in the direction of the least resistance, towards the
surface of the cervical canal, from which the growth invades
the external os and even the portio vaginalis, where it replaces
the normal squamous epithelium of the vaginal mucosa.

The surface of the new glandular growth is irregular, and
uneven, resembling the papilla of the tongue, much congested.
There is an increased supply of blood, the new channels running
superficially under the epithelial covering of the hypertrophied
glands, as well as in the deeper structures. The excessive vas-
cularity and exuberant glandular hyperplasia of the cervix are
suggestive of a heteroplastic pathology, of more than enlarge-
ment and multiplication of local cells, but the morbid process
still conforms to the type of simple glands, and consists essen-
tially of rapidly developing epithelial cells, and vascular con-
nective tissue.

The intensification of the glandular hyperplasia, which de-
pends upon a continuation and increase of the initial inflam-
mation of the cervical glands, results not only in an extensive
overgrowth of adenoid tissue, subject to the cystic alterations
already described, but also in an infiltration of the underlying
connective tissue of the mucosa, and later of that which goes to
make up the walls of the cervical canal—the muscularis. The
infiltration is induced by a pushing forward of the rapidly in-
creasing cellular elements, as well as by leucocytes that have

escaped from the overcharged vascular channels. Thus sooner
or later all the structures of which the lower segment of the
uterus is built up, become involved in the process of inflamma-
tion that had its starting point in the mucous glands of the cer-
vical canal.

As the overgrowth develops towards the free surface, it conforms in
general outline less and less to the simple glandular type, and assumes a
palisade contour.   These papillæ rise above the surface, and be-
ing over-nourished, and composed of exceedingly soft tissue,
bleed upon the gentlest touch, and break down under slight
injury.

Proceeding still further in simple glandular hyperplasia,
these same papillæ become pedunculated, and there projects from
the cervix a polypus, composed of cervical glandular tissue, the
stroma of which, as the result of erratic development, has be-
come myxomatous.   It is probable that in adenomatous polypi of
the cervix is found the last expression of simple glandular hyperplasia,
and that beyond this line a more complicated pathology marks
the cellular genesis, and arrangement.

Still another phase of intense inflammation and infiltration,
but one that does not belong to the early stages of glandular
hyperplasia, is necrosis of the superficial structures.   This does oc-
cur, and presents all the characteristics of ulcers in other loca-
tions.   There is thus a true ulceration of the uterine cervix. The sur-
face of the new growth is destroyed, and the dead structures
are cast off, together with the epithelial cells and pus that is
secreted from the surface.   This necrosis is usually the result
of injury, either instrumental or that following too strong
and vigorous chemical applications used in local treatment,
and therefore should be looked upon, not as an essential feat-
ure of glandular hyperplasia, but as an accident that is
liable to occur.

Increased function is a necessary result of glandular hyper-
plasia, and hypertrophy, and therefore cervical catarrh, cervical
leucorrhœa, is always present in erosion of the uterine cervix.
The engorged cervical glands pour out their secretion, a
thick, viscid, gelatinous discharge, containing cast off epi-
thelial cells, and sometimes red blood corpuscles. The char-

acter of the epithelial cells varies with the particular construction of the part affected. Cylindrical and squamous epithelial cells are found chiefly in cervical leucorrhœa. Later, extravasated leucocytes are mixed with the secretion, and the catarrh becomes muco-purulent.

Normally the secretion of the cervical glands is alkaline, and the cervical canal is occupied with a plug of like reaction, but this character is changed after mixing with the acid secretion of the vagina. The latter secretion also undergoes alterations, becoming alkaline, a condition favorable to bacterial life.

The Etiology of erosion of the cervix, endocervicitis, is inseparably connected with the genesis of micro-organisms, and is infectious in character. The infection usually spreads from the vagina, an **ascending vulvo-vaginitis;** very rarely is it caused by a descending endo-metritis. It may be due to direct infection, as from gonorrhœa, or other local inoculation. Such cases are especially liable to follow laceration of the cervix in parturition, or any trauma that leaves the mucosa exposed to absorption. An irritating uterine catarrh is capable of inducing the necessary changes, and is not infrequently the first step in infection of the cervical glands. It is an interesting fact, that frequently the phlogistic agents are arrested in the cervical mucosa, and expend their force locally, there being no absorption into the pelvic tissue. If the several layers of which the cervix is made up eventually participate in the inflammatory process, or if the body of the uterus suffers, it is more likely to be by contiguity, than infection through the medium of the lymphatics.

The certainty of **gonorrhœa as a cause of endo-cervicitis** is more firmly established, than it is frequent. Of course no case would be pronounced specific until the essential organism has been discovered to be present, but even with the gonococcus demonstrated, it is not certain that the endo-cervicitis is caused by it. The cervical disease may have, and frequently has, antedated the specific infection, the latter being added to an already existing pathology. It is well to submit the discharge from any suspicious case to the microscope, and thus place ourselves in possession of all available etiological factors.

Constitutional conditions must be reckoned with in the history of endo-cervicitis. Any disease that perverts metabolism; that makes demands upon the system that cannot be met by attention to hygiene; that causes waste in excess of repair, or that interferes with the elimination of the harmful products of nutrition; any dyscrasia, inherited or acquired, that induces an enfeebled state of the system, is capable of causing such changes in the mucous membrane, as render that structure susceptible to the invasion of micro-organisms that otherwise would be powerless, and without means of gaining an entrance into the circulation.

Among such constitutional diseases **the uric acid diathesis occupies a foremost place,** catarrhal inflammation being frequently associated with gout, and rheumatism. Bronchial and gastric catarrh so commonly accompany lithæmia, as to assist in rounding out the clinical picture, but it is doubtful whether a fully developed glandular hyperplasia of the cervical mucosa, such as we have studied, would be caused even by an intense gouty inflammation; such a pathology is probably always dependent upon the additional factor of micro-organisms.

Tuberculosis, which will receive further attention in a separate chapter of this work, is liable to induce inflammation of the cervical mucosa, with an especial tendency to attack the cervical glands, inducing their hyperplasia and hypertrophy. There is then present a mixed infection, tubercular inflammation, to which is added that of micro-organisms by way of the vagina. Many tuberculosis subjects are prone to this phase of the constitution that possesses them.

Anæmia, and chlorosis, inasmuch as they deplete all mucous membranes, induce changes in the cervical mucosa that invite the invasion of micro-organisms; and if to this constitution there is, as is usual, a relaxation of the natural supports of the uterus, permitting falling of the organ and consequent friction of the os against the vaginal walls, a sequence of etiological conditions is in force, that leads to glandular hyperplasia of the uterine cervix. This condition belongs to youth, in which chlorosis is most frequent.

Sufficient prominence has not been accorded the **exanthe-**

mata in their relation to diseases of the uterus. That they in a pe-
culiar manner affect the nutrition of the uterus, arresting its
development and causing it to retain its infantile shape, and
size, there is ample evidence, and there is reason to believe,
that, especially scarlet fever and measles, both of which pro-
duce characteristic lesions in the mucous membrane of the
mouth and pharynx, may cause similar patches in the mucous
membrane of the uterine cervix, which by an intensification of
the process, offer local conditions favorable for bacterial inva-
sion.

In married women, and in those who have been examined
vaginally, or been the subject of local treatment, traumatism is
the initial cause of a large percentage of the cases of endo-cer-
vicitis. Foremost in this class stands the lacerated cervix of par-
turition. The hernia of the mucous membrane that attends
this accident, and the actual opening of the structures of the
sub-mucosa, have already been discussed in connection with
the sequela of laceration. The questions relate to opening the
door for the entrance of micro-organisms, and the limits set
by the resisting power of the tissues to their absorption.

Any destruction of the epithelial covering of the mucosa, as from
instrumental examination, or denudation as the result of
caustic treatment, must be classed as primary causes of endo-
cervicitis. Such are frequently overlooked, but there is little
doubt that many cases of inflammation of the cervix have
their origin in a too vigorous use of instruments, and in too
heroic local medication.

The Symptoms of erosion of the cervix, are inseparable from
cervical catarrh—cervical leucorrhœa—which is always pres-
ent. The body of the uterus is liable to be invaded by the
same process that affects the cervix, and therefore the symp-
toms may be masked with those of endometritis. The early
stages of erosion of the cervix may pass, or the disease may
continue for a length of time without giving evidence of its
existence, but it is doubtful if a well marked erosion is ever
present that does not give rise to local and constitutional
symptoms, which careful investigation will trace to this
source.

The local symptoms are leucorrhœa, which cannot however be positively distinguished as cervical without exposing the cervix, for the cervical catarrh undergoes radical changes when mixed with the secretion of the vagina. There is a constant dull aching pain referred to the sacral region. The location of this pain and its chronic character are quite characteristic of the diseased cervix. The patient is usually a multipara, or if she is a virgin, her history will include some constitutional disease, gout, tuberculosis, or chlorosis.

In the former case the symptoms have frequently followed childbirth, or abortion. The patient is constantly tired. She has no endurance, being fatigued after the slightest exertion. Her back is weak, not painful, but in need of support, to which end her stays are grateful, and are usually worn rather snug, for the relief they afford.

Menstruation is not interfered with in cervicitis unless the endometrium is involved, when the attendant swelling of the cervical mucosa narrows the lumen of the canal, and obstructs the flow of the menstrual blood.

Digestion is usually impaired, there being little desire for food, especially in the morning. The process is retarded, and stomatchic fermentation becomes permanent as the disease passes into a chronic form.

The bladder is not infrequently irritated. This may be regarded as of a gonorrhœal origin, but acute urinary symptoms very commonly form a marked feature of cervical inflammation not associated with venereal disease. There is frequent desire to empty the bladder, with more or less dull pain in the suprapubic region, giving rise to the suspicion of cystitis. A urinary analysis will determine this point.

The patient is usually sterile, but dyspareunia is not present unless the uterus, or the pelvic cellular tissue is involved.

If constipation is present it is probably caused by the inactive life that has been forced upon the patient, and not by any specific action that the inflamed cervix may have exerted upon the intestinal canal.

The foregoing will do no more than suggest the existence of endo-cervicitis, the exact diagnosis will rest upon a **vaginal examination.**

If we would familiarize ourselves with every feature of a vaginal or uterine disease, we should not make an examination for at least twelve, or twenty-four hours after a vaginal douche has been given, for if the bath has been of any service, it has removed valuable diagnostic signs, and has probably temporarily altered the local pathology, as we should see it. Therefore, with the symptoms and history pointing to endo-cervicitis, I prefer to make a vaginal examination with no more than an external bath.

From the character of the leucorrhœa, which will be the first symptom to note, we will begin to build a diagnosis. If upon separating the labia we find a white milky discharge, with which are mixed strings of mucus, the vagina is surely involved in the pathological process, and is contributing its secretion to that of the cervix and uterus. If the discharge is mucoid, stringy and tenacious, the cervix is the seat of the catarrh. If mingled with blood in any stage of decomposition, or with pus, the catarrh is still cervical, but probably glandular hyperplasia and hypertrophy enter into the pathology.

A sanious muco-purulent leucorrhœa will at once raise the question of a pathological new formation that has passed beyond the simple glandular type of construction, but further examination will make for or against this suspicion.

While the pathology of erosion may be the same in both instances, the appearance of the portio-vaginalis differs according as the patient is a nullipara, or a multipara, for in one instance the integrity of the os is preserved, in the other there will be more or less pronounced evidences that the cervical canal has suffered traumatism during the passage of the child. This is shown in irregularities in the os corresponding to the lacerations, a condition that does not commonly belong to the nulliparous cervix, and in a greatly increased tendency to relaxation and ectropion of the cervical mucosa. The same degree of pathology therefore in women who have not borne children, will in those who are mothers become accentuated without materially changing the pathology, but each feature is intensified, and the appearance is one of greater gravity.

A Digital examination should precede that with the speculum, for we thus ascertain the undisturbed position of the cervix, its size, and the relation it bears to the body of the uterus. We are also able to discover a laceration if present, and its extent, and the degree of resistance offered by the cervix, thus obtaining valuable information regarding the character of the structures involved in the pathological process. We will also learn the degree of cervical dilatation, whether as in some cases we can pass the finger almost to the internal os, or whether in others the cervix is quite obliterated. All these data have important bearings upon the diagnosis and treatment.

Upon withdrawing the finger, the character of the discharge that has adhered to it will be noted.

The points of diagnosis follow closely the lines with which pathology marks the several phases through which erosion passes from its simplest form, to that of a cervical adenoma, hyperplasia, and hypertrophy of the glands of the cervix.

Under the following classification the subject of endo-cervicitis, may be conveniently discussed:

a. **Simple follicular erosion.**
b. **Papillary erosion.**
c. **Polypoid erosion.**

Similar follicular erosion of the nulliparous cervix presents few characteristic indications upon a digital examination. The os is perhaps softer, and more velvety than normal, and if the disease is well developed, the enlarged *ovula Nabothi* are felt as small tense bodies that roll under the finger. If the inflammation is considerable, the entire portio is somewhat larger than would be expected, but it is not sensitive unless the body of the uterus is involved in the morbid process. The os is small, and the cervix of normal consistency.

Digital examination of the multiparous cervix discovers a more intense process. Catarrh is a pronounced feature, the cervix is softer, and the os more widely open. There is also usually some indication of a cervical laceration. The *ectropic mucosa* bulging from the canal over the lower part of the cervix, may convey the sensation of a mushroom, or dumb bell organ, but in neither nullipara nor multipara does the erosion add

anything to the cervix, the morbid process is not raised
above the surrounding surface.

Examination with the speculum.—For this purpose I prefer a bi-
valve instrument with broad blades, the patient being in the
dorsal position. The mucosa of the os, and for a varying
extent over the cervix, is seen to be intensely red and con-
gested, having the appearance of raw flesh. The parts may
be almost purple from congestion, but usually they are only
bright red. They have a granular surface, and the blood
channels are visible immediately underneath the epithelial
covering. The parts are bathed with mucus at this stage of
the disease, rarely mixed with pus, and the os is filled with a
tenacious plug of the same secretion. One is surprised upon
attempting to cleanse the surface, that it does not bleed
readily, showing that it is not raw, being in fact covered with
a thin layer of epithelial cells.

It is **characteristic of erosion of the os,** that the line of demarca-
tion between the morbid and the healthy processes is very
clearly marked. This is a feature that does not belong to any
but benign growths, and disappears as the pathology becomes
more complex. A laceration of the os is easily recognized, the
inflamed mucosa covering its surfaces, and encroaching on the
angle of the fissure.

In varying degree, the surface is covered with small sage-like
bodies, *cysts*, filled with yellowish-white, turbid matter. These
when opened with a tenotome, discharge one or more drops of
fluid. The walls usually collapse, but may refill with blood,
and continue as *hæmorrhagic foci*.

The cervical speculum shows the mucosa of the canal to be
affected in a manner similar to that of the os and portio. The
normal folds and rugosities which seem to be developed earlier
than at the os, are thrown into prominence by the glandular
hyperplasia. Vascularity also seems to be of a high degree,
for blood almost always follows the use of the sound.

Papillary erosion of the cervix is not common in nullipara, simple fol-
licular erosion in them rarely progressing to the papillary stage.
When in virgins or married women who have not borne chil-
dren there is an appearance of papillary erosion, the pathology

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will usually be found to be that of a heterogeneous new forma-
tion, and to have passed beyond the simple glandular hyper-
plasia that characterizes the disease we are studying.

Digital examination of papillary erosion discovers an hypertrophied
cervix, and an os sufficiently enlarged to admit the finger. The
surface is soft and velvety, and projects beyond the normal
boundaries of the infra-vaginal portion of the uterine cervix.
In this condition exists the first of what may be called an over-
growth of the cervical glands. The process is one of hyper-
plasia, increase in number, as well as of hypertrophy, increase
in size, of the gland cells, and those of the mucosa. There
may be the same mushroom shape of the cervix that charac-
terizes the simple form of endo-cervicitis.

**The speculum exposes an illy-defined, highly vascular overgrowth of
tissue,** which at first appears to fill the vagina, but is found to
be confined to a greatly enlarged cervix, and covers all that
portion of the lower segment of the uterus that occupies the
vagina. Upon closer examination it is found that a consider-
able proportion of this glandular mass is a hernia of the cervi-
cal mucosa, and of that part which surrounds the os externum.
The cervix is set in this, as in a bowl. The growth, for such
we are now dealing with, has the appearance of exuberant
granulations, though it is composed of simple glands cov-
ered with a layer of epithelial cells. The surface is thrown
into ridges and corresponding sulci, that radiate from within
the cervical canal, outwards. The resemblance to inflamed
papilla of the tongue is striking. The parts are covered with
mucus. This, if the process has been one of intense cellular
infiltration, and the superficial structures in consequence
broken down, will be mingled with pus, and shreds of necrotic
matter. A light touch will induce rather free bleeding.

As papillary erosion usually occurs in multipara, the os will
be found lacerated. The surfaces of the laceration are every-
where covered with the hyperplastic mucosa, and there can be
no doubt that the destruction of the integrity of the cervical
canal favors the ectropion that forms so marked a feature of
papillary erosion.

The uterus usually sympathizes with papillary erosion of

the cervix, the same process, though less truly adenomatous, there being fewer glands in the body of the uterus than in the cervix, ascending from the inferior portion of the canal.

The surface is frequently occupied with one or more cysts, not the small cysts of the follicular erosion, though as the pathological boundary lines cannot be strictly maintained these may appear, but larger sacs, situated somewhat deeply in the substance of the growth. **These are for the most part retention cysts,** formed by the closing over of the walls of a fissure, or sulcus. They contain mucus, variously altered by the local process that caused their formation. Sometimes a cheesy substance composed largely of epithelial cells fills the sac. They may also contain blood, when they appear as dark swellings beneath the surface, resembling hæmorrhoids.

In common with rapidly increasing vascular new formations, **papillary erosion of the cervix is liable to necrosis.** There is then a true ulceration. The necrotic spot does not usually involve either much extent, or depth of structure, and is recognized as a denuded surface covered with pus. The pathology is local, and may be regarded as an accident of the erosion.

Polypoid erosion of the cervix differs in degree rather than in kind, from papillary erosion. It is the extreme expression of simple glandular hyperplasia, and may, the local and constitutional conditions being favorable, be a developmental link between the innocent and the malignant new formations; between simple glandular hyperplasia, complex cystic adenoma, or adeno sarcoma.

Digital examination discovers a soft, yielding, easily bleeding mass, occupying the cervix. The leucorrhœa is muco-purulent, mixed with blood, and may be offensive.

The appearance through the speculum is an exaggeration of that presented by papillary erosion. Single areas of the adenomatous hyperplasia become pedunculated, and hang from the cervix in the midst of the less developed glandular tissue, as **mucous polypi.** These are composed of glands similar to those that normally occupy the cervix, and may contain cysts, or may hang in clusters. The mass is irregular in outline, and extremely vascular, and from the crowding of the new glandu-

lar tissue the os may become almost obliterated, save to the
uterine sound, which discovers the same condition to have in-
vaded the cervical canal, even as far as the internal os.

The appearance of polypoid erosion of the cervix is strongly
suggestive of malignancy. The exuberance of the growth, its
rapid development and vascularity, are characteristic of neo-
plasms that are not structurally the same as the tissues in
which they occur. But the chronic nature of the morbid pro-
cess, and the absence of constitutional involvement, together
with the evidence of the microscope, will establish the diag-
nosis in favor of innocence.

While I do not regard the findings of the microscope con-
clusive in the matter of prognosis, for the purpose of complete
diagnosis it is advisable to submit to this examination all phases
of an eroded cervix. Even simple erosion may exhibit signs
of heterogeneous glandular growths, and tissue arrangement,
that must have a bearing upon the treatment. As long as the
new growth is a reproduction of simple cervical glands, and
of the cervical mucosa, and there is no tendency to an invasion
of the muscularis by glandular elements, the condition may be
looked upon as one of innocent hyperplasia. In the polypoid
erosion, section of the growth shows it to be composed of
nothing more than glandular tissue built upon the plan of the
local glands, but there is only a short step between this and
the neoplasms that are not constructed upon the plan of any
organ or tissue that functionates for the well being of the
entire organism.

The Treatment of erosion of the cervix will be constitutional and
local, for the condition cannot be cured by one method alone.
The treatment will also always adapt itself to the pathology
present; this will more especially concern local and surgical
treatment.

The constitutional treatment will consist principally of hygienic
directions for improving digestion and assimilation, and for
maintaining a balance in favor of repair, as against waste, in
the process of metabolism. We will, by healthy living, place
the system in the best possible condition to resist the further
invasion of micro-organisms, and deprive them of a soil in
which they can live.

The special dyscrasia that predisposes to or aggravates the disease, will of course receive attention. In meeting this phase of erosion of the cervix, the dynamic drug will be of preeminent importance, for it is impossible to cure the local lesion while its cause continues active. Any adequate discussion of the treatment of lithæmia, anæmia, tuberculosis, scrofula, or the exanthematous diseases, would be beyond the plan of the present work, but the close relation that is known to exist between these dyscrasies, and the development and continuation of erosions of the cervix, makes it evident that we must have regard to the constitutional condition if we would cure the local.

If gout is behind the endometritis, and this will be determined by the usual diagnostic signs quite independent of the local lesion, we will first, as I believe it to be the rational treatment in all cases of lithæmia, seek by the administration of uric acid solvents, to dissolve the uric acid, and place in the most favorable condition for functional activity, the eliminating organs. We cannot dispense with this alkaline treatment, which in no manner interferes with the action of dynamic remedies; on the contrary it removes systemic conditions that would retard, or neutralize their action.

In this respect each physician has from his experience, adopted certain lines of treatment. My own practice lies in the ingestion of large quantities of alkaline water, preferably *Vichy Celestins*, which should be taken warm, and from one pint to a quart in twenty-four hours. This water not only dilutes the uric acid and urinary solids, but acts as a mild biliary stimulant, thus bringing into requisition the greatest of the eliminating organs, the liver. The intestinal canal is usually torpid, in which state *Sprudal salts* will be found useful. If the patient is anæmic, even if the cervical erosion cannot be said with certainty to depend upon this constitution, hygiene, in the direction of forced out of door exercise, a diet calculated to enrich the blood, and some blood tonic, will greatly aid in effecting a cure of the local disease. *Pepto mangan, (Gude)*, or *Hemaboloids*, either with or without *Arsenic*, I have found of service. *Ovoferrin*, or *Hemoquinine*, may meet certain indications for treatment.

Tuberculosis associated with erosion of the cervix, is usually a local, as well as a constitutional, disease and when present, must be treated with forced nourishment, to deprive the bacilli of below-par-tissue to feed upon. (*Chapter IX.*)

Scrofulosis, not being a disease, but rather a constitutional condition that invites chronic inflammation and tissue hyperplasia, is in a marked degree dependent upon faulty metabolism. It may be regarded a predisposing cause of morphological changes and tissue disturbances, the exciting cause being more or less local. Under the influence of scrofulosis, the resisting powers of the system are lowered, and it cannot withstand the invasion of deleterious influences. The question is one of ability to maintain health in the matters that pertain to the invasion of the system by micro-organisms, and resolves itself into one of proper nourishment. Therefore, again, hygiene is the chief weapon in overcoming this diathesis.

Scrofulosis is more common in youth than in adult life, the cases therefore of scrofulous erosion of the cervix are usually those of young girls, in whom the local disease develops coincidentally with puberty. If the constitution has not been brought up to par before that period, the prospects are not encouraging for the individual, but every effort should be made to establish a healthy metabolism in view of the possible children of such a parent.

The remedies that in my hands have assisted in the treatment of erosions of the cervix, are mainly the tissue remedies, and those that produce a profound action upon the structures of the body. Foremost among these I place *Potassium, and its salts.*

In *Kali muriaticum,* we have a remedy of very wide application in all phases of erosion of the uterine cervix, and I have learned to depend upon it, perhaps more than any other remedy in the treatment of this disease. It corresponds to chronic inflammation of the interstitial cellular tissues, and to the hyperplasia of the follicular glands, essential features of cervical erosions, and of the varieties most commonly encountered in practice. *Kali mur.* induces changes in epithelial

cells by which they are rapidly thrown off from their basement structures, and such an increased activity of gland cells, as to greatly augment their secretion. Constitutionally there is shown a predisposition to chronic inflammation, and the enlargement of glands, which action broadens its field of usefulness sufficiently to include scrofulosis.

The cervical erosion of *Kali mur.* is of the simple follicular variety. The glandular hyperplasia is smooth, not greatly elevated above the surface, and bathed with the excessive mucous secretion of the cervical glands. The catarrh is perfectly bland, and with the uterine disease there is usually catarrh of the vagina, the pudendal discharge being a mixture of cervical and vaginal secretion, transparent, and milky white. The entire process is indolent, and chronic, with little disposition to excessive activity, or exuberant growth.

Kali phos. will be indicated when tissue destruction is rapid. There is depression of the nervous system, neurasthenia, and physical exhaustion after slightest exertion. Digestion is slow. Anæmia—this salt affects the blood corpuscles most profoundly—and hæmorrhage from mucous surfaces upon the slightest provocation, the blood being thin, and not coagulating readily.

Paroxysms of pain in the pelvis, with paralytic lameness followed by exhaustion, are indications for *Kali phos.* I know of no other remedy, aside from opiates, that is as certain to relieve the pains of malignant disease of the uterus, as this salt. All the discharges of *Kali phos.* are extremely offensive, and this remedy is among the first to be suggested for a foul smelling leucorrhœa. The eroded cervix that indicates *Kali phos.* corresponds to the general action of the drug. It may or may not represent a high degree of glandular hyperplasia, but the nutrition of the morbid growth suffers, and the quality of the blood supply is defective. Hence the surface of the erosion in places shows a disposition to break down. If there are cysts they will be filled with blood, and the local condition may be characterized as hæmorrhagic. There is a muco-purulent sanious leucorrhœa, very offensive, and irritating.

Kali sulph. will occasionally be called for in the treatment

of erosion of the cervix. This salt corresponds to retrogressive metamorphosis of tissue, especially the epithelial cells covering mucous membranes. Mucous glands are excited to increased activity, and there is a rapid desquamation of epithelial cells. The catarrhal secretion from the surface so affected is very profuse, consisting of large quantities of mucus made yellow and thick by the admixture of numerous epithelial cells. This is the character of the cervical leucorrhœa. The surface of the erosion is soft, and rather pale in color, for the blood is poorly oxydized. The enlargement is due more to the swelling of the retrograde epithelial cells that have been cast off, than to glandular hyperplasia, though the latter is also present. There is little disposition to hæmorrhage, local irritation of the eroded surface being more likely to be followed by an increase of the catarrhal discharge, than by blood. The patient is apt to be chilly, but craves the stimulation of the open air, even though cold. In other words, her system is deprived of oxygen, and she seeks to force it into her blood.

Silicea will be found indicated in the presence of scrofulosis. The concomitant symptoms rather than the local condition, will point to its use. The surface of the erosion is unhealthy, and there is the characteristic free formation of pus.

Mercury, from its action on mucous membranes, and the glandular system, will at once suggest itself in the treatment of erosion of the cervix. The general action of all the mercurials is one of profound tissue changes, but with this destructive process there is great irritability, and general nervous erethism. This remedy is especially adapted to papillary and polypoid erosions. The surface of the adenoma is pale and spongy. It bleeds readily, and the discharge is mucopurulent. There is necrosis, the ulcerated spots being somewhat deep. The presence of metritis, and pelvic cellulitis, will be additional reasons for its exhibition.

Iodine, deserves careful consideration in the treatment of papillary erosion of the cervix. The constitutional condition is one of rapid emaciation, though the appetite may be excessive. Scrofula is well marked. The os uteri is swollen, and the sur-

face soft.   The glandular hyperplasia is marked.   The local condition that indicates *Iodine*, is the impression conveyed to the finger of a soft papillomatous tissue, movable over the somewhat hard indurated cervical body.   The leucorrhœa is yellow and purulent, excoriating the vagina and vulva, causing such sensitiveness of the parts, and wherever it touches, as to render an examination extremely painful.   It is also characteristic of the *Iodine* catarrh, that it corrodes the linen, destroying wherever it touches.

Hydrastis Can. will be indicated in the severer forms of erosion.   Its action upon the cervix is very marked, and those cases of advanced hyperplasia in which the epithelial surface is attacked, the loss of structure being superficial, rarely deep when *Hydrastis* is indicated, in which there is a marked tendency to hæmorrhage, and in which the catarrh is almost exclusively cervical, muco-purulent, and tenacious, will suggest the *golden seal.*   There is usually dull pain in the back, and down the thighs, differing from the *Kali phos.* pain which is paroxysmal and lancinating.   The digestive organs sympathize with the uterine disease.

Phytolacca will be suggested by the rheumatic diathesis. The erosion is follicular, the Nabothian glands showing marked involvement.   Dysmenorrhœa is liable to accompany the cervical pathology.

Thuja should be studied when gonorrhœa enters into the etiology of the erosion.   Everywhere the new formation shows a power of excessive development, the new growth assuming a shape to accommodate itself to its situation.   *Thuja* is especially indicated in polypoid erosion when the pedunculated adenomata are well marked.   The catarrh is not profuse, but has a peculiar, fetid, metallic odor.   Inflammation of the left ovary is an additional indication for the use of *Thuja.*

Hydrocotyle Asiatica corresponds to the more acute forms of erosion of the cervix.   Especially do I think of this remedy when the uterus and the pelvic cellular tissue are involved in the morbid process, or when they are secondary to the cervical lesion.   There is marked ectropion of the cervical mucosa,

which is highly congested, and its surface occupied with nu-
merous hypertrophied glands, giving the appearance of granu-
lations. The anterior lip of the cervix especially, is affected.
There is a profuse, bland mucous catarrh. There is intense
pain in the uterus, which is heavy, large, and sensitive to
touch. The pain is more severe on the left side in the region
of the left ovary, and is dull and persistent. The vagina is
hot and burning, with insupportable itching, which involves
the vulva. With this superficial irritation there is no local
lesion.

The following remedies may also be studied, in the treat-
ment of erosion of the uterine cervix:

*Argentum n., Calendula, Mezereum, Nitric a., Graphites.
Sanguinaria, Kreosote, Phos. a., Carbolic a.*

The chief reliance in the treatment of erosion of the uterine
cervix, will be placed upon applications made directly to the
diseased tissues, and upon surgical procedures that have for
their object removal of the local pathology.

The Local treatment will consist of that which the patient uses,
and that which the surgeon applies through the speculum.
The former will be by means of douches, and these will have
mainly two objects in view. *First*, and foremost, cleanliness,
which means to render the vagina aseptic, and clean it of act-
ive micro-organisms. *Second*, to apply therapeutic agents to
the vagina and portio vaginalis more frequently than it would
be practicable for the surgeon to repeat his treatment. To
combine these two requisites, therefore, is the object of the
vaginal douche, which must be regarded as an important ad-
junct to the topical application to the cervix.

The method of administering a vaginal douche is of moment, and
should always be carefully explained to the patient, and to the
nurse, until we are assured that they are both well trained in
this particular. A fountain syringe holding two quarts is the
best instrument for the purpose, and because of more perfect
sterilization, I prefer a glass vaginal tip. The usual rubber
tip sold with the syringe, cannot, even with boiling, which is
liable to change its shape, be made clean. Some particle of
matter may remain in the tip that is not observed. The shape

of the tip, be it of glass or rubber, should follow the natural
curve of the vagina, otherwise its insertion is liable to injure
the posterior vaginal wall.   The most scrupulous cleanliness
must be observed in the care of the tip.   It should be boiled
after each using, and kept in a solution of carbolic acid.

The douche stream does not require much force, an elevation
of the reservoir three feet above the pelvis is quite sufficient.
Unless for other conditions the patient is confined to her bed,
I find no sufficient reason for her to assume the dorsal posi-
tion while taking the douche.   In the dorsal recumbent posi-
tion the upper end of the vagina and the portio are con-
siderably lower than the vaginal outlet, especially if the
perineum is intact.   This position of the vagina therefore
forms a pouch—which is capable of retaining a considerable
quantity of fluid as long as the position is maintained—and
cannot be thoroughly cleansed.   The axis of the vaginal tube
is changed with the sitting position, which is mechanically
better adapted for simple irrigation, and cleansing.   If con-
tinuous irrigation is desired, as in pelvic cellulitis, or me-
tritis, in which the prolonged action of heat upon the tissues
is the object to be attained, the recumbent position is recom-
mended as the one favorable to that end, but commonly I
direct my patient to sit on a commode, with her back well
supported while taking a douche; to remain until the vagina
has emptied itself, and to lie down immediately after, to pre-
vent the local congestion that may follow.

Too much cannot be said in condemnation of a high **tem-
perature of the douche.** The physiological effect of any degree
in excess of 105 to 110, at the most, cannot fail to be injuri-
ous.   The temporary relief is sometimes great, and will lead
the patient to increase the temperature of the douche as she
loses her sensibility to it, but the reaction induces congestion,
and favors relaxation of the pelvic structures.

The drugs that I use most frequently for douching in the
treatment of erosion of the cervix, are *Carbolic acid, Sulphate
of Zinc, Creoline, Boracic acid,* and *Electrozone.*

Carbolic acid has perhaps the widest range of usefulness.
In the strength of 1–60, or even 1–100, it is a sufficiently power-

ful germicide for the majority of cases; is sedative, and assists healthy tissue reproduction. A *Carbolic acid* douche, 105°, will frequently afford prompt relief if there is active inflammation, and its use can be continued over a length of time without fear of deleterious effects. Quite as frequently I order my patients a douche of *Sulphate of zinc*, ʒii in one quart of water. This drug exerts a specific action upon the eroded surface, stimulating the squamous epithelial cells, which under its action are seen to develop in tongue-like groups on the catarrhal patches. The astringent properties of zinc are also beneficial to the entire vaginal mucosa, and will be found useful in controlling the irritation that accompanies some phases of cervical erosion.

Creolin, ʒi in one quart of water, will be useful in controlling a fœtid leucorrhœa, and when there is swelling—cellulitis—of the vagina and vulva, with sensitiveness. The cervix is swollen and hypertrophied, the submucosa being involved.

Boracic acid, though a mild germicide, is useful in treating the less severe varieties of cervical erosion. It controls the leucorrhœa by stimulating the glands to healthy action, and prevents desquamation of the epithelial cells, thus being prophylactic against the initial steps that lead to necrosis and ulceration of the glandular hyperplasia.

I seldom use *Bichloride of mercury* as a douche in erosion of the cervix, principally for the reason that the catarrh is albuminous, and corrosive sublimate coagulates albumen. It therefore does not cleanse the vagina, and it may be questioned whether in the presence of albumen it can be regarded as a trustworthy germicide. On the examining table, after all mucous discharge has been removed it may be used, but its destructive action on instruments will exclude it from the examining room.

The local treatment of erosion of the uterine cervix, adopted by the surgeon, involves propositions somewhat different from those that prescribe the treatment for other lesions that seek to restore the continuity of the structures, for it will be remembered that there is no loss of tissue—save as a complication—nor does the morbid process make towards repair. The

process is glandular hyperplasia, unlimited in growth, and tending to heteroplastic tissue development. Our first consideration therefore is to remove the adenoma, and obtain a base of healthy tissues upon which to work. This may be done with caustics, or with the dull curette.

In operations on the uterus I am opposed to *the use of caustics*, save in certain cases. Their action is uncertain, and may accomplish more or less than we expect, or desire. The eschar may not be aseptic and the pus that forms beneath it is liable to absorption through the numerous uterine lymphatics. Therefore, with the exception of recent cases in which the erosion has not yet become follicular, I prefer as a preliminary to topical applications, to go over the diseased surface with the dull curette, removing the new formation, and mucosa, down to the muscularis. If the curettement does not include the endometrium, general anæsthesia is unnecessary. This part of the treatment should always be made at the patient's home, never in the surgeon's examining room.

The most satifactory exposure of the portio-vaginalis for local treatment, is made with a broad bi-valve speculum, or with a large caliber tubular speculum, unvarnished, and of length corresponding to the depth of the vagina. For cleansing the vagina preparatory to treatment, I use a spray of compressed air; first, *Peroxide of Hydrogen*, followed as the condition may suggest, with one of the preparations recommended for the vaginal douche. This is most frequently *Boracic acid*, or if the odor of the discharge requires, *Creolin*.

Simple, recent erosions, without ectropion of the cervical mucosa, when the glandular hyperplasia is not above the level of the cervix, when the surface is congested, but not markedly hæmorrhagic, respond to applications of *Nitrate of silver*, 10 grains in one ounce of distilled water.

Argyrol (silver Vitellin) possesses all the advantages of *Nitrate of silver*—the salt contains 30 per cent. of silver—without the disadvantages of irritation, subsequent cicatricial contraction, and the coagulation of albumen. In a 50 per cent. solution, it controls, possibly better than any other agent, a muco-purulent cervical catarrh, and in this strength may be freely applied to the eroded cervix.

If the surface is rather soft, but still not cystic, I apply *Iodine*, or *Churchill's tincture*, and sometimes *Iodine* and *Carbolic acid*, equal parts. *Formalin* in a 2 per cent. solution is also of service, especially if gonorrhœa is present, or the surface is dirty, but even in this solution *Formalin* will sometimes cause intense suffering, and be followed by a deep eschar that is difficult to heal.

Chromic acid, grains 10 in one-ounce of water, is useful when there is vascular dilatation, a light touch causing oozing of blood. *Chromic acid* possesses the further advantage, that its action is limited to diseased tissue, and will not attack healthy structures.

Acetic acid, and *Carbolic acid*, in the proportion of 20 drops of the latter in one ounce of the former, are useful when the eroded surface appears smooth and glassy, and rather pale in color. This preparation may be applied freely, either by spraying it into the speculum, where it remains in contact with the cervix for a few minutes, or by a much neater method, that of holding pledgets of cotton soaked with the solution, against the diseased tissues for the length of time desired.

In the majority of instances it is of advantage that the drug used should come in contact with the diseased surface only, and therefore no more than the quantity necessary to paint the parts should be carried by the applicator; any excess is liable to follow the speculum as it is withdrawn, and possibly denude the usually hypersensitive vaginal mucosa of its epithelial covering.

Papillary erosion with cystic development, is distinctly a pathological new formation, an adenoma, and as such its removal is accomplished more thoroughly, and quickly with the curette, than with medicinal agents.

Under the strictest aseptic precautions, it is my practice to **curette with a dull instrument,** all cases of erosion of the cervix that have passed beyond simple glandular development, working from the cervical canal outwards, to the line of demarcation between the hyperplastic growth, and the healthy vaginal mucosa. The entire adenomatous surface is gone over with

the utmost care, and the submucosa exposed, thus preparing
a field for the development of healthy granulations. The
bleeding is sometimes active, but is readily controlled by dry
sponging.

The denuded surface is painted with a 50 per cent. solution
of *Carbolic acid*, and a simple glycerine tampon, on which is
dusted *Boracic acid*, is placed against the cervix. This is al-
lowed to remain for twenty-four hours, and renewed after
a douche, usually of *Carbolic acid*. By giving the douche
before removing the tampon, injury to the cervix by the pos-
sible adhering of the dressing is avoided, otherwise the newly
formed granulations are disturbed, and repair delayed.

If this part of the procedure has been successful, the case
becomes one of a simple granulating wound, for it has there-
by lost the character of a pathological new formation. Ap-
plications of *Nitrate of Silver*, ten grains in one ounce of
water, or of *Argyrol*, 50 per cent. solution, every third or
fourth day, and later once a week, will, with continued douch-
ing, and the medicated tampon, restore the cervical mucosa
and glands to a healthy condition. *Iodine*, or *Carbolic acid*, or
a solution of equal parts of each may be called for if the
granulations become exuberant; but this is not likely to occur
if the silver applications are used from the beginning.

The medicated tampon has become a routine practice in gynæ-
cology, and in consequence has suffered abuse. It has come
to be the custom, no matter what the treatment, or for what
it is instituted, to insert a glycerine, or otherwise medicated
tampon in the vagina; but it must be evident that no such
universal condition belongs to gynæcic diseases, as to possess a
remedy applicable to all cases. It does not follow because
the uterus or vagina are unhealthy, that a tampon must form
a part of the treatment; we must first know the sphere of
action of the tampon, what it will accomplish, and what effect
we may expect to follow its use, and then apply this knowl-
edge to the treatment of the individual case.

The vaginal tampon accomplishes two things; it offers support to
the uterus, and is the means of continuous medication to the
vaginal canal, but the uterus is not always out of place, or in

need of support, neither are the best ends always served by
prolonged drug applications to the diseased area.   Further-
more, the tampon retards free drainage from the vaginal
fornix, and keeps the structures at the superior end of the va-
gina bathed in their own morbid secretion.   Therefore, while
the glycerine tampon variously medicated is of inestimable
service in the presence of a heavy, enlarged uterus, with pel-
vic cellulitis, in the absence of these conditions, this especial
action of the tampon is not indicated, and if we only desire to
make applications to a diseased area, we can do so through
better means than by filling the vagina with medicated cotton.

I have no routine method in the treatment of erosion of the
cervix.   If there is chronic or acute metritis, or pelvic cellulitis;
if, and such is frequently the case, the cervix is large, and hy-
pertrophied, and the mucosa œdematous, after curetting the
adenoid tissue I use a glycerine tampon medicated with either
Boracic acid, or *Ichthyol*, 50 per cent.   *Iodoform* fills a place
in gynæcological therapeutics that admits of no substitute,
but in private practice its use is almost prohibited.   In hospital
work there is not the same objection to its use.   It has a most
beneficial action on healing wounds, and especially on lesions
of the genital canal.

When the erosion is accompanied with considerable catarrh, or puru-
lent discharge, the case is retarded by the continued use of a
tampon after an application to the cervix.   It is more satis-
factory to treat the erosion every second day, and depend upon
douches, and the natural drainage of the vagina.   Wounds will
heal, if aseptic, and those of the uterine cervix form no excep-
tion to the general laws of surgery.   *Boracic acid, Carbolic
acid*, or a *Zinc sulphate* douche, are the most frequently use-
ful in the treatment of eroded cervix after curettement.   In
general the first named will meet the indications more fre-
quently than the other two.

The Operations for Erosions of the Cervix—curettement can hardly
be classed as an operation—have to do especially with the more
pronounced types of glandular hyperplasia, papillary and poly-
poid erosion, and also have regard to the closing of the lacer-
ated cervix, which is so frequently the precursor of cervical
adenoma.

The object of the operation is to remove all glandular overgrowth in the cervical canal, and as far as it extends over the portio vaginalis. If the operation accomplishes less than this, it is not radical, and will probably necessitate repetition. The wisdom of the radical technique is shown in the frequency with which malignant neoplasms develop in a cervix that has been the seat of glandular hyperplasia. It is certainly conservative surgery to remove a portion of the lower segment of the uterus, if by so doing future removal of the entire organ is avoided.

There should be no difficulty in determining the cases that are to be operated upon. The clinical phenomena, and the pathological divisions already mentioned, though there may be intermediate phases, are sufficient guides for treatment, if we remember that the glandular tissue has now passed beyond all structural control, and that its erratic developmental power may lead to histogenic tissue development. I think we may assume without fear of contradiction, that gynæcological statistics will contain fewer malignant neoplasms of the uterine cervix, when it becomes the established practice to remove by operation all glandular hyperplastic growths of the lower segment of the uterus that do not yield readily to simpler methods of local therapeutics, and curettement.

The preparation for the operation of removing hyperplastic and hypertrophied cervical glands, should be made with all the care necessary for a major operation upon the vagina. When the cervix is markedly cystic, it will insure more perfect asepsis if the cysts are punctured several days before the operation, and the cavities touched with pure *Carbolic acid.* If there is endometritis the uterus should be scraped. Sometimes in the severer forms of papilloma, and polypoid erosion of the cervix, the mucosa of the portio, and the entire vagina are in a state of high inflammation. The presence of this will be fatal to the success of the operation, and attention should be directed to its cure before the operation on the uterus is undertaken. For this purpose I have found nothing more useful than an *Argyrol* $\frac{1}{1000}$, douche, or when a mild astringent is indicated, *Sulphate of zinc* ʒi in a pint of water. The vagina must be made aseptic, even the indigenous micro-organisms should be

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washed out.   *Argyrol* fulfills this requirement, followed by
swabbing with *acidulated alcohol.*

The operation.—Usually the cervix has been lacerated.   By
slightly prolonging the commissure, the anterior and posterior
lips of the cervix are turned out, and the line for the incision
of the cervical mucosa clearly defined.   With the uterus well
dislocated, and the lips still separated with volsella, an incision
is made through the cervical mucosa down to the muscularis,
at a line already determined upon.   This incision completely
encircles the cervical canal.   If there has been no laceration,
sufficient eversion of the cervical canal can be accomplished to
determine the line of incision, by this same use of the volsella
without the additional mutilation of splitting the cervical canal.

The two volsella are now brought together, approximating
the uterine lips.   By drawing down the mass, which in-
cludes the prolapsed cervical mucosa and the hyperplastic
glandular new formation, the boundary line between the heter-
oplastic and the normal mucous membrane can be clearly made
out, and an incision is carried around the infra-vaginal portion
of the cervix, through healthy tissue, down to the muscularis.
With a pair of sharp-pointed scissors, curved on the flat, the
external and the internal incisions are connected in such a
manner as to form a ring, which includes all the structures
that have undergone glandular hyperplasia.   It is neither
necessary nor advisable to encroach deeply upon the muscular
structure of the cervix. The hyperplasia develops in the
direction of the least resistance, and not inwards.   The mor-
bid process is confined for the most part to the mucosa, and
the amputation should be confined to that structure.

If the laceration of the cervix is not deep, the lips may be
included with the ring removed, but if the tear is at all exten-
sive, it should be repaired as in the usual operation for lacer-
ated cervix, after the vaginal and cervical mucous membrane
are brought together.

Unless the muscular tissue has been deeply encroached upon
in the incision, the bleeding need not delay the next step of
the operation, and even should it obscure the field, dry spong-
ing, or the insertion of a few sutures, together with more forc-
ible traction upon the uterus, will control the oozing.

The best **suture material** is No. 2 chromic catgut, and the most convenient needle for the insertion of the sutures is a half-curve surgeon's needle.

The sutures should be placed from the cervical canal, over the cervical muscular tissue, to the vaginal mucous membrane, from within out.   As the cervical mucosa is easily torn, the needle may include a portion of the muscular tissue, but beyond this it should pass completely over, and free of, the muscular tissue.

To avoid too much puckering of the mucosa of the portio-vaginalis, four sutures may be placed, anterior, posterior, and lateral, and between these as many as may be necessary to secure coaptation.   This method has been referred to in the treatment of lacerated cervix.

The after treatment will not differ from that advised in the treatment of trachelorraphy.

CHAPTER IX.

SPECIFIC INFLAMMATION OF THE UTERINE CERVIX.—TUBERCULOSIS.

The inflammations of the lower segment of the uterus thus far discussed, while due to a variety of recognized causes, and tending to various results, are in no single instance dependent upon specific micro-organism, the life history of which gives rise to a definite local pathology, the clinical course of which is towards a definite end.

The conditions are different that attend **the formation of the typical lesion of tuberculosis.** We have here a process of chronic inflammation, in which granulation tissue occupies a principal part, caused by the irritation induced by the introduction into the tissues of a specific micro-organism, the bacillus tuberculosis, which securing lodgment, develops *in loco* a characteristic nodule, anatomically distinguishable from all other structures, and clinically having no counterpart in other inflammatory processes.

The inflammation therefore of tuberculosis is a specific inflammation, which differs from other chronic inflammations as to its cause, its essential chronicity, and the tendency to caseous degeneration that enters into the morphology of the tuberculous nodule.

In some respects the tuberculous lesion comes within the definition of malignant neoplasms. The characteristic mature nodule is an independent focus of abnormal cell activity, that withdraws from the system the enzymes essential to the life of its cells, and at the same time gives out its own enzymes, that are antagonistic to healthy cell nourishment.

The construction of the tuberculous nodule before necrosis—caseation—begins, is arranged upon a definite plan, unknown in mature tissue building, and is represented by a heterogeneous cell mass that serves no purpose beneficial to the organism. The clinical course of the focus of cell activity is malignant, in

the sense that its existence and morphology are incompatible with health, and invariably lead to death if not arrested.

In **the method of growth** by infiltration into the surrounding tissues, and by displacement of the matrix cells, or their actual incorporation with the tubercular tissue, striking resemblances exist between the nodules of tuberculosis, and malignant neoplastic cell formations, but at least one basic difference obtains that suffices to place the new formations in wholly remote pathological classes. **The history of the tubercular lesion** shows that the cellular elements alone, possess no power of proliferation, or of metastatic multiplication; in every instance the initial lesion as well as the secondary and remote developments depend upon the presence of specific micro-organisms, the *bacilli tuberculosis*, and not upon the migrating cell elements of the tuberculous nodule that become arrested at some spot in the circulation favorable to their multiplication and growth. This method of diffusion at once removes tuberculosis from the class of malignant neoplasms, and places the disease among specific infectious inflammations.

Tuberculosis is essentially a bacterial disease, and no case should be regarded as such in which the bacillus tuberculosis cannot be demonstrated, or in which inoculation cannot be successfully accomplished.

The primary position of the micro-organism as the cause of tuberculosis, places the tubercular nodule in a position of secondary importance, and therefore in studying the pathogenesis of this disease, we must not unduly magnify the significance of the nodule, which is nothing more than the effect of a specific local irritation, but should turn our especial attention to the bacillus tuberculosis as the object claiming consideration.

The propriety of looking upon the tubercle bacillus as the essential factor in the morphology of tuberculosis, requires no more convincing support than the clinical fact that the vitality of the tubercular lesion is entirely dependent upon the presence of its specific micro-organism—for though innoculation with dead tubercular structures apparently barren of bacilli has been followed by the development of tubercle-like nodules, these

have not been demonstrated to be actual tubercles—and also, that the nodule in its caseated parts contains few if any bacilli, and that the lesion tends to heal by the formation of cicatricial fibrous tissue when no longer vitalized by the presence of the essential bacillus. The nodule is the anatomical measure of tuberculosis, the structure by means of which the bacillus exerts its characteristic effect upon the system.

Bacilli tuberculosis are distinguished as minute rods, straight or slightly curved, with thin ends, somewhat swollen. They do not arrange themselves in true chains, and when not single, are attached end to end, thus forming obtuse angles. Compared with their length, these micro-organisms are thin, usually measuring 2.5 μ., to 3.5 μ., about one-sixth the diameter of a red blood corpuscle, while their thickness does not exceed .8 μ.

Their chief characteristics reside in their behavior when subjected to staining processes. This bacillus takes up staining matter slowly and faintly, for which reason the most powerful solutions must be used, *e. g.*, gentian violet, or fuchsin, with analine oil water. The bacilli should be subjected to these dyes for a long time; their action is accelerated by heat.

Even with these staining materials the tubercle bacilli are not uniformly colored, and present small transparent spots, between darkly stained parts. Such uncolored spots have been regarded as *endospores*, but this is probably an error, as they do not present the degree of refraction peculiar to spores. Most probably they represent vacuoles within the rods, but upon this subject it is at present impossible to speak definitely. This inequality of staining is more noticeable in the older organisms, those found in the caseated mass, the younger bacilli coloring more readily, and quite uniformly.

The tubercle bacilli resist decolorization after staining, the "*acid fast*" characteristic belonging to no other bacillus found in the human body, save possibly the *smegma bacilli*, but these do not resist the action of acids to the same degree as do the tubercle bacilli.

In many respects these two micro-organisms resemble each other. The smegma bacilli are non-pathogenetic, and are

numerous in the region of the external genitals. They occur as slightly curved organisms, but shorter than the tubercle bacillus. They stain with difficulty, but take up the coloring matter uniformly. They also resist decolorization with mineral acids, but readily lose this color after a minute's exposure to alcohol. These morphological features, together with absence of a focus of pathological new cell formation, should serve to distinguish the two micro-organisms from each other. Both bacilli are to be found in the vaginal secretions, but the tubercle bacillus cannot long exist without a dependent nodule, while the smegma bacillus gives rise to no lesion.

The bacillus tuberculosis is of slow growth compared with other micro-organisms. It is devoid of motility, multiplies slowly, and looses its vitality, or dies with the caseation of the tuberculous nodule.

This micro-organism retains its vitality for a considerable time outside of the body, in which respect it resembles the spore bacilli. It resists drying, and putrefaction, conditions rapidly fatal to many other pathogenic micro-organisms, but is rapidly destroyed by exposure to sun light. Normal salt solution, boullion, or milk at a temperature of 60. C., maintained for twenty minutes, are fatal to tuberculous bacilli.

The Tubercle, or Tuberculous Nodule, is the anatomical characteristic of tuberculosis. It arises as the result of irritation caused by localizing of the bacillus tuberculosis in the tissues, in much the same manner as granulation tissue is formed under conditions of local tissue irritation. In man the tumor does not commonly attain a size greater than that of a millet seed—**miliary tuberculosis—and invariably terminates its nodular life in caseation.**

The tubercular nodule is made up of one or more giant cells, the result of enlargement of single epithelial cells, that contain many nuclei arranged around the periphery, or at one pole of the cell.

Surrounding the mass is a zone of elongated endothelial cells containing large vesiculated oval nuclei, with yet another zone of small finely granular lymphoid cells. The former cannot be distinguished from young connective tissue cells, which are the bodies first acted upon by the tubercle bacilli after it

gains admission to the system; the latter are identical with lymph corpuscles.

The cells of the tubercle nodule, in common with the cell elements of other pathological new formations, lie in a connective tissue stroma, and resemble a rude imitation of a lymphatic gland. **The nodule is avascular,** containing no blood vessels, for capillaries cannot develop in the presence of tubercular bacilli, and the blood vessels already existing at the time of infection, are early occluded by thrombosis.

In consequence of the absence of blood vessels, when the nodule has acquired a certain size, **central necrosis** takes place, the process of caseation soon involving the entire mass. Central necrosis and caseation are also in a measure due to the toxic products of the bacilli, which interfere with local, as well as general metabolism.

Ulceration follows, with consequent destruction of tissue. The ulceration is further extended by the coalescence of caseous tubercles that develop in close proximity to each other, and also by the later necrosis of the processes that the tuberculous nodules throw out into the inter-cellular tissue. The diseased structures thus become a mass of tuberculous tissue, in which the individual nodules can no longer be demonstrated.

The tubercular ulcer has for its base the characteristic caseous structure. The loss of tissue progresses superficially, not in-involving any considerable depth, the outline is sharply cut, and perpendicular, but irregular, and the caseous tissue passes rather abruptly into a zone of granulation tissue. The shallow base of the ulcer, even though occupied with caseous degeneration, is frequently studded with granulations that have resisted the necrotic process.

The effect of the tubercular lesion upon its matrix is slowly destructive, the pernicious influence being a continuation of the primary process of irritation by the bacilli, which exist in largest numbers and are most active at the periphery of the nodule where the tissues are healthy, and where the microorganisms obtain the most abundant nourishment.

The destruction of tissue is accomplished in a two-fold manner. Either by implantation, the bacilli coming to occupy

space at the expense of the surrounding tissue, when the cells are pushed aside; or the matrix cells are incorporated within the pathological mass by the same process of infiltration that marks the primary development. The latter process is less common, for the peripheral zone of progressive infection that marks the boundary of the nodule is usually productive of sufficient inflammation to raise a wall of inactive fibrous tissue hyperplasia, the effect of which is to encapsulate the morbid growth, and present nature's barrier against its further extension. **The entire process is chronic, and the destruction is superficial.** It spreads on the surface rather than invades the deeper structures.

The development of Tuberculosis in the Mucous Membranes, and with this we are here especially concerned, begins with the formation of distinct tubercles that occupy the mucosa or do not involve structures deeper than the sub-mucosa; the underneath muscularis does not share in the pathological process, which pursues an essentially chronic course.

The most common avenues by which the bacillus tuberculosis gains entrance to the body are the respiratory tract, and the gastro-intestinal tract. This micro-organism resists for a considerable period the secretions of the mouth, and the stomach, and therefore gains admission to the more central organs with vitality unimpaired. If not arrested in the pulmonary capillaries, or the intestinal follicles, they pass into the general circulation to lodge at some remote point, where, finding nourishment, they pass through their life cycle.

A less frequent method by which the bacillus gains admission to the tissues, though of more vital interest in connection with genital tuberculosis, is through abrasions of the skin, or of the mucous membrane of the genital tract. Direct implantation is probably the most infrequent source of tuberculosis of the cervix and vagina, but we cannot exclude the possibility of the lodgement of bacilli in these parts, they being the *locus minoris resistentiæ.*

The diffusion of the bacillus tuberculosis is accomplished most frequently by means of the blood vessels, less frequently by the lymphatic channels, unless the disseminating focus is a

lymph gland, and even then, in order to reach tissues not supplied with lymphatics, the essential elements of infection can only do so by means of the blood circulation.

The tubercle bacilli are more frequently diffused within a restricted area, in the neighborhood of the initial lesion, than carried to remote parts, at least such is the case in the early stages of the disease, when the process is of the nature of an eruption of tubercles within a short distance from an already existing tuberculous focus. Here undoubtedly the blood vessels are the media of conveyance, the bacilli becoming arrested, and finding nourishment near the initial tubercle. This eruption of tubercles is soon followed by involvement of the lymphatics that receive their lymph from the diseased area.

In as much as **the presence of a tuberculous nodule does not confer immunity upon the surrounding tissues,** it is possible that direct implantation of bacilli may take place simultaneously at several points, there being a corresponding number of abrasions. Genital tuberculosis may have its origin in such an infection, for we frequently find the disease in this region to be made up almost from the beginning, of numerous lesions, developed too rapidly to have arisen from a single implantation.

The Etiology of Tuberculosis of the Female Genital organs, and in a more restricted sense of the uterine cervix, has no other meaning than all that concerns the life history of the tubercle bacillus, its lodgement and development in the human organism.

We will discard as unproven, and inconsistent with the known morphology of this bacillus, **heredity as a causative factor of tuberculosis.** The disease is infectious, and the point of location and growth of the specific micro-organism is determined by a local inability to resist its invasion and multiplication. Such conditions may be acquired as the result of poor hygiene, privations and under-nourishment. They may also develop from local irritations that involve tissue changes favorable to the life of the micro-organism, but the only relation heredity bears to the development of tuberculosis, is a predisposition to local faulty nourishment, which is sometimes apparently transmitted from parent to offspring. In the absence of the tubercle bacillus, such a point of least resistance

may serve as a fertile field for the growth of any other path-
ologic micro-organism as well.

The source of infection of the uterine cervix with tubercular bacilli,
may be from above, the uterus, Fallopian tubes, and perito-
neum, or through the urinary tract, the kidneys and bladder—
secondary genital tuberculosis—or more rarely by way of the vagina
—**primary genital tuberculosis.** When the infection travels down-
wards, the cervical lesion is likely to be an expression of ab-
dominal or general tuberculosis. In such cases the genital tract
is more or less involved in the morbid process, and the develop-
ment in the lower segment of the uterus a continuation of the
disease in the fundus. On the other hand, primary tubercu-
losis of the cervix rarely ascends, it does not pass beyond the
internal os, and frequently constitutes the solitary manifesta-
tion of the disease in the genital tract, or in the body.

Two etiological factors stand in almost equally important
relations to each other; the condition of the os and cervix,
and the presence of the specific micro-organism. An abrasion
of the mucosa, or an erosion of the os, may act as predispos-
ing causes, and if to these is added an inherited tendency to
chronic inflammation, the conditions are present for success-
ful inoculation with the essential bacillus.

The tubercle bacilli may be introduced into the vagina, and brought
in contact with the uterine cervix, during coitus. Genital
tuberculosis is more common in men than in women, the male
urethra, testes and prostate gland frequently containing the
bacilli without giving other signs of tuberculosis being pre-
sent. An unsuspected tubercular peri-urethritis may exist,
or minute ulcerated tubercles of the glands be present. The
possibility therefore of infecting women during coitus is con-
siderable, and should be taken into consideration in all sys-
tematic methods adopted against the spread of the disease.

The discharge from a tuberculous ulcer contains the essential
micro-organisms and infection may follow a gynæcic examina-
tion if the surgeon has previously dressed such a case. Or a
tuberculous rectal abscess may break into the vagina, or opening
on the outside, the infected pus find its way into the vagina.

Still another source of infection of the vagina that cannot

be disregarded, arises from the **discemination of the dried sputum of tuberculous patients.** Happily this danger is becoming less and less a factor to be reckoned with under improved sanitary conditions, but it still exists. The tubercle bacilli so desiccated, may be blown against the vulva, as women walk in the streets, or sit in our public conveyances, and having once reached the outer parts, easily gain an entrance to the deeper organs. The infrequency of genital tuberculosis in women, considering the conditions of society, and the widespread prevalence of the disease, may be attributed among other causes, to the normal chemical reaction of the vaginal secretion, which is inhibitory to pathogenic micro-organisms, and also to menstruation, which carries away bacilli that have found lodgment in the vagina, and miliary tubercles that have already developed in the cervical mucosa.

The Clinical History and Symptoms of Tuberculosis of the Uterine Cervix. Tuberculosis of the uterine cervix as a primary disease, corresponds to the period of greatest sexual activity, from the 20th to the 40th years. The extremes of life in which tuberculosis of the cervix has thus far been recorded, range from the 7th to the 80th years.

The mucosa of the cervical canal, lined with columnar epithelium, and its numerous glands, offer more vulnerable points for infection than the mucous membrane of the portio, with its stratified epithelium, and lack of glandular structure. **The disease appears as an eruption of miliary tubercles,** either just within the internal os, or, if grafted on an erosion of the cervix, at the line where transition takes place between the two varieties of epithelium. In the presence of an abrasion through which the bacilli enter the tissues, this anatomical barrier is not effective.

Cervical tuberculosis does not differ from the miliary tubercles developed in other mucous membranes. To the naked eye the tubercles appear as minute grayish, somewhat translucent pearly bodies, situated directly beneath the epithelium of the mucosa, which remains intact. The tubercles themselves are avascular, but rest on a more or less inflamed base, caused by the irritation of the specific organism.

The certain tendency of the tuberculous nodule is towards caseation, and as this proceeds from the centre it involves the mucosa, which thus becomes a part of the necrotic process, resulting in a tuberculous ulcer; in a restricted sense, **Lupus of the mucous membrane.** In case the cervix is occupied with an eruption of tubercules, they are shown in various stages of destruction, so that the diseased surface may contain both tubercles, and tuberculous ulcers. By encroaching on the periphery, the single ulcerated tubercles gradually coalesce, and the surface is occupied with a vast ulceration. **This ulcer is irregular in outline,** with perpendicular edges. It has a cheesy floor that shows little irritability, and does not bleed when touched. The entire pathological process is chronic, and reacts sluggishly to stimulation.

A cervix uteri studded with tuberculous ulcers, prior to their coalescence, presents a characteristic appearance. The surface seems to be dotted with small, rather clearly punched out spots. These spots or ulcers have a caseous base, and are surrounded with a zone of deeper red, almost purplish color; or the neighboring mucosa may be the seat of inflammatory processes, but in the earlier stages of ulceration the former appearance is the most common. Later, when ulceration has advanced and the cervix has become hypertrophied and indurated as the result of chronic inflammation, the edges of the ulcer as well as its base, develop irregular vegetations that become bathed in a yellow, grumous, foul smelling secretion. This more advanced stage of tuberculosis of the cervix involves the mucosa of the cervical canal; the *arbor vitæ*, as well as the glands, then become a part of the tuberculous destruction.

By processes—*pseudopodia*—thrown out from the nodule, the new growth may extend into the muscularis of the cervical wall, by which means the ulceration is deepened, and the underneath structures destroyed. **These tuberculous extensions usually follow the course of the blood vessels.** The chronic nature of tuberculosis opens the possibility of a large portion of the cervix being destroyed by such an extension of the morbid process.

Beyond the limits of the actual tuberculous infiltration of this advanced form of the disease, there is set up a marked degree of cervicitis, that extends to the cervical endometrium, but rarely beyond the internal os, which marks the limit of many morbid processes that have their initial lesion at the portio vaginalis.

Occasionally **primary tuberculosis of the cervix leads to the secondary infection of other organs,** and this may take place with a perfectly healthy uterine body intervening between the diseased cervix, and the abdominal or pulmonary infection. The abraded surface at the site of the primary lesion is the probable avenue by which the bacilli enter the blood vessels and lymphatics, by which they are conveyed to the point of least resistance, where they find lodgement.

Tuberculosis of the cervix is frequently accompanied with the development of miliary tubercles in the vagina, inoculation taking place by contact, though as already stated, the pavement epithelium covering the vagina and the portio offer a certain immunity against the invasion of these micro-organisms. The diagnostic value of this feature will be referred to later.

With tuberculosis of the cervix that has advanced to the stage of ulceration, **there is always a profuse catarrh containing bacilli, cheesy matter and pus.** There may also occur profuse hæmorrhage, not from the tubercle, which is avascular, but from the surcharged blood vessels in the surrounding structures, and from vessels laid open by the advancing ulceration.

The menstrual function does not generally appear to be affected by tuberculosis of the cervix, or of any portion of the genital tract. Such disturbances may occur, but in no respect differ from those that attend other varieties of inflammation of the uterus and adnexa.

The pyrexia, and faulty metabolism that belong to general tuberculosis, are due to the absorption, dissemination through the system of the toxic products of the tubercle bacilli, and possibly in a lesser degree when ulceration takes place, to the toxines of saprophytic bacilli that live on necrotic tissue. As long as the tubercular process is confined to the limited region of the cervix, or the lower genital tract, these systemic condi-

tions are not marked. There may be a slightly accelerated pulse and corresponding rise of temperature, suggesting septic absorption, but the cachexia is not present until the peritoneum or lungs become involved.

The disease runs an essentially chronic course, and unless by metastasis, general distribution, or the supervention of other factors, may continue for a length of time without materially affecting the health.

The Diagnosis of Tuberculosis of the Uterine Cervix cannot be positively established without the conclusive evidence furnished by the microscope. This will determine the presence or absence of the bacillus tuberculosis, which must be regarded as the crucial test of the disease. The lesion itself however, and the clinical history of the miliary tubercle, will serve to suggest a diagnosis, that the microscope confirms.

Secondary tuberculosis of the uterine cervix is recognized with little difficulty. The pulmonary or pelvic conditions are manifest, and these are strong evidence that nodules situated in the cervix, intact or broken down, are a further manifestation of the general disease.

But the symptoms of the uterus may be entirely overshadowed by the disease in other organs, and for this reason, unless the presence and character of the pudendal discharge direct attention to the uterus, extensive tubercular degeneration of the cervix may exist without the knowledge of the surgeon. It would be well to make a gynæcic examination of all women who are known, or suspected to be the subjects of tuberculosis. The examination would possess no other value however, than evidence of the extent to which the system is infected.

The Diagnosis of Primary Tuberculosis of the uterine cervix cannot be made upon *prima facia* data. We have in this a local pathology that must be studied with little assistance from general conditions, and must be diagnosed, *first*, from the naked eye appearance, *second*, from the clinical history, and *third*, from the findings of the microscope. We have further to differentiate between tuberculosis and epithelioma of the cervix, which have many features in common.

The naked eye appearance has been described. Tubercles are scattered around the os, less frequently over the portio, and vagina. The external parts may be occupied with superficial, cheesy ulcers. When there is an eruption of tubercles, there are always some that have broken down, either on the cervix, or vagina, and therefore both varieties of tubercular lesion are present. The base of the ulcer is covered with caseous material, and looks as if it had been punched out of the tissues of the cervix. No other condition of the cervix resembles miliary tuberculosis prior to coalescence of the tubercles, and a diagnosis can almost be made upon the isolated nodule, and multiple ulcers, situated upon a more or less inflamed base.

The uterus becomes more or less fixed as the disease invades the fundus, or the adnexa, and may become so laterally if there is a high degree of inflammation spreading to the broad ligaments.

After the nodules have encroached upon each other, and the inter-nodular space is occupied with ulceration, the diagnosis will rest upon the irregular perpendicular edges, the shallow excavation, and caseous non-vascular floor of the ulcer.

Inasmuch as **inoculation of tuberculosis may take place through simple contact of mucous membrane with the broken down tubercular nodule,** the diagnosis is further strengthened by the presence on the vaginal fornix and the superior part of the vagina, parts that are held in constant relation with the tubercular cervix, of tubercles similar to the primary nodule. Such a multiplication of pathological foci does not appear in any other disease.

The tuberculous nodule that originates in the *arbor vitæ* of the cervical canal, develops towards the surface, and finally projects as a nodulated mass—*papillary tuberculosis*—from the external os. This form is sometimes difficult to differentiate from epithelioma of the cervix; the lines between the two pathological processes, however, can be made out. **The tubercular tumor is not friable to the same degree as epithelioma,** and does not bleed as readily when manipulated. Neither has the discharge the same penetrating odor. The extra nodular

structures are darker, and there is an absence of the cervical induration that characterizes an epithelial neoplasm. There are also usually batches of tubercles on the vaginal walls. Pain is rarely present even in the later stages of tuberculosis of the uterine cervix, and cachexia develops only with the general distribution of the disease.

The microscope will confirm, or disprove **the diagnosis of papillary tuberculosis,** but as the tubercle bacilli are generally not numerous in tuberculosis of the genital tract, repeated examinations should be made before pronouncing definitely upon a suspected case that at first yields only negative results. Nor should we in making an examination depend upon either the discharge, or the scrapings of the ulcer; a specimen including the outer zone of the tubercle, where the bacilli are the most numerous and vital, will contain the micro-organisms, when the secretion from necrotic tissue is barren of bacilli.

A further and valuable differentiation between tuberculosis and epithelioma of the uterine cervix, is found in the greater chronicity of the former disease. It develops very slowly, and after reaching the stage of caseation, remains inactive, or but slowly progressive. The entire morphology is characterized by indolence, while epithelioma is marked by rapidly advancing tissue destruction.

The Treatment of Tuberculosis of the Uterine Cervix.—The infectious nature of tuberculosis, and the entirely local lesion that characterizes the disease, are suggestive of local measures for its eradication. And such would undoubtedly be effective if we could apply our methods while the disease is in its incipiency, or if we knew the conditions under which the tubercle bacilli migrate from the primary nodule. As with an epithelial neoplasm, the early stages of tuberculosis of the cervix frequently pass unobserved, and when brought to the knowledge of the surgeon the pathology is far advanced, and the disease past eradication.

We have at present no certain means of determining the earliest stage in the history of the tubercle, at which the micro-organisms enter the circulation, nor do we know the conditions under which, having migrated, the bacilli become encapsulated as the result of in-

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flammatory reaction, and remain inert until excited into activity by a local decrease of the resisting tissue forces. Until we are in possession of these data, eradication of the local disease, which may be the only demonstrable lesion, cannot be regarded as a cure of the tuberculosis, for though we emove the cervical manifestation, specific inflammatory organisms, temporarily inert, it may be, remain unmolested n the system.

And still we have no alternative in **primary tuberculosis** of the uterine cervix, but to remove by the most radical measures at our command, the focus of local pathology, provided, let it be emphasized, there is ground for believing that no general infection has taken place. By radical measures I mean, complete hysterectomy, including the ovaries, tubes, broad ligaments, and the upper part of the vagina. The more conservative practice of amputating the cervix, will not accomplish all that surgery can offer in the treatment of these cases, for the very uncertainty that surrounds the early distribution of tuberculosis, makes it incumbent upon us to remove as wide an area as possible, hoping thereby to fix our boundary outside the line of infection.

In **Secondary tuberculosis of the cervix uteri,** or when the disease, having originated in the lower segment of the uterus, from there infects remote parts, any other than a palliative treatment will not be thought of. The grosser lesions demand consideration, and will be treated by forced general feeding, and such hygienic measures as insure the most exposure to fresh air, and light.

Along this line of treatment, the radio-active substances, *radium*, *thorium*, and the like, concerning which we are scarcely at the threshold of a knowledge of their action, promise much. **The tubercle bacilli cannot live in sun light,** and we may reason that the concentrated rays of the sun, as stored up in these radio-active substances, as well as the electricity generated, may prove inimical to their existence. The proposition is the method of applying these forces.

Cervical tuberculosis as a secondary contagion, is liable to be associated with the development of tubercles in the vagina,

and external genitals, and will be treated upon the lines indicated for the treatment of cervical catarrh. Aseptic and deodorizing douches meet the therapeutic requirements. If hæmorrhage is a persistent symptom, the ulcer may be touched with the fluid extract of *Hydrastis*, and *Tannic acid*, ten grains of the latter in one ounce of *Hydrastis*. *Chromic acid* may also be thought of. *Iodine* and *Carbolic acid*, in equal parts, will be found useful.

The progress of the ulceration is sometimes arrested, and the foul discharge controlled by curetting the caseated tubercle, and painting the ulcerated surface with the tincture of *Iodine*. Under this treatment the broken down surfaces heal with astonishing rapidity, and remain covered with granulations for a considerable length of time. The improvement however is only temporary, for the reparative process is again interrupted by tubercular infection from outlying *pseudopodia*, and the condition becomes as before.

Inasmuch as this curettement is a very minor operation, and can be done without general anæsthesia, the tubercular ulcer being quite insensitive, it may be repeated as often as indicated by the character of the discharge.

The Medical treatment of tuberculosis of the uterine cervix must be one with the medical treatment of general tuberculosis, but will avail little unless associated with hygienic measures directed to the improvement of nutrition. This subject belongs to general medicine, but in seeking a class of remedies that act upon the tissue cells, and leucocytes in such a manner as to enable them to resist the invasion, and nourishment of tubercle bacilli, we may feel especial confidence in the tissue remedies. Among these the combinations of *Phosphorus* stand out prominently, and of these *Magnesium phos.* is deserving of our first consideration.

This salt enters into the construction of tissue cells, and blood corpuscles, and when deficient, the caseous degeneration that characterizes the nodule of tuberculosis is favored. Experience has shown *Mag. phos.* to be a valuable addition, to the hygienic treatment of tuberculosis.

CHAPTER X

NEOPLASMS.

GENERAL CONSIDERATIONS.

Group I.

CONNECTIVE TISSUE NEOPLASMS.

The tissue changes of the uterine cervix that we have thus far studied, though pathological in the sense that they are neither reparative nor functional, and represent an intensified power of reproduction not demanded by use, are conformable to local morphology, and introduce into the location in which they take place nothing new in construction, or foreign in cellular type. Each portion of the hyperplastic cervix, contains nothing more than a detailed exaggeration of normal cervical histology. The epithelial cells in particular, the connective tissue cells in lesser degree, after acquiring this definite type, have merely parted with their habit of work, and reverted to their habit of growth, thus assuming the role of proliferating, rather than that of functionating cells.

Neoplasms present entirely different problems for consideration, but it is difficult to frame a definition that satisfactorily includes the structural and clinical features that distinguish the various phases of a neoplasm from other pathological processes. For while the lines that mark a fully developed neoplasm are unmistakable, the almost insensible gradations by which in some instances the group of inflammatory new formations and hyperplasias pass into the pathological new growths and the illy defined processes by which non-malignant growths assume malignancy, obliges us to be contented with a definition of neoplasms that embodies only their essential features, and takes cognizance alone of the differences in construction and life history, between them, and all other processes.

A neoplasm is an independent focus of new-tissue-formation, that differs in construction from the tissues in which it grows; that finds no

prototype in normal extra-uterine tissue; that in function serves no useful purpose in the general well being of the system, and the increase of which follows no inherent laws, either in conformation, or in growth.

From this definition is excluded the conception of tumor and swelling as of necessity belonging to neoplasms. A neoplasm may be a tumor, and its development may be accompanied with swelling, but these phenomena attend both physiological and pathological processes, and are therefore not characteristic of neoplasms.

The structural differences between neoplasms and the tissues in which they grow, the matrix tissue, are generally easily recognized even by the naked eye, and consist for the most part in an eccentric arrangement of the cells and intra-cellular substances, that corresponds with tissues normally found in early intra-uterine life—*atypical.*

Neoplasms possess neither lymphatics, nerves nor blood vessels, a structural characteristic more pronounced as the neoplasms approach the malignant type. The spaces that occur between their cells are in no sense lymph channels, but accidental openings through which the lymph circulates. Neither does any arrangement exist in the neoplasm that can be regarded as a system of vascular channels. There are spaces between the cells in which the blood flows, but these have not a true endothelial wall, and possess none of the characteristics that belong to a venous or arterial system. Hence the impossibility of ligating an artery in the substance of a neoplasm; the hæmorrhage can be controlled only by pressure, or by securing the main vessel before it enters the new growth.

It is a basic law of tissue building, that cells "breed true," a law controlling abnormal as well as normal processes. An epithelial cell can always be recognized as such, a connective tissue cell never loses its identity. Therefore the structural differences between a neoplasm and its matrix are not traceable to local cell genesis, but to a proliferation, by which cells belonging normally to intra-uterine life, appear in the mature organism, and in tissues that belong normally to extra-uterine life.

These facts strengthen the conception of neoplasms as independent organs, for diligent search will always reach the

outermost zone of the new growth, possibly broken in places, where even transitional cells cease, and a line of inflammatory reaction is built up by nature to defend against invasion. In most cases, especially if the neoplasm is of slow growth, the inflammatory zone, composed of small round cells and proliferating connective tissue cells, is organized into a connective tissue barrier, which appears as **the capsule of the growth.** But if the neoplasm grows rapidly, as is the case in most malignant new formations, this distinct barrier is imperfect, the matrix of normal tissue failing because of rapid proliferation, to encapsulate the mass of abnormal cells which then exists as an irregular zone, outside of any fibrous tissue that may be produced by inflammatory action.

Pursuing the conception of a neoplasm as a focus of activity, an organ quite distinct from the general economy, and endowed with a certain functional activity, we realize that the exercise of this function must be to the detriment of the system, and in no way contributory to its well-being. The life history therefore of neoplasms must be opposed to health, for even the neoplasms that are regarded as benign, are capable, under conditions that excite them to action, and to a breaking down of nature's protective connective tissue barrier, of contributing that to the organism, which affects more or less profoundly healthy metabolism.

It may be said of organic architecture, as of all pure construction, that its object is that of use, and that the underlying principle is an adaptation of form to the best accomplishment of certain definite purposes of function. The building of the human organism is in accordance with such laws. The construction and conformation of each part is definitely fixed for the good of the whole, and any growth and development, either in deficiency or in excess of this plan, becomes lawless, and proceeds in opposition to the general design. **Neoplasms are lawless in construction and growth. They are without design, and do not enter into the general plan according to which the body is built up.**

The Etiology of Neoplasms is an attractive study to the speculative mind, for speculation and theory, not knowledge and

demonstration, are of necessity the chief avenues by which the subject is approached, and go to make up the great bulk of contribution to this branch of pathology. But whatever theory may be held as to the origin and cause of neoplasms, we must recognize that these cannot be distinguished fundamentally from the forces and conditions that precede, initiate, and preside over constructive metabolism, and that determine the building of normal tissues, and their future behavior. For as has been pointed out (*Chapter V.*), vitality is one, whether it is concerned with the development of the liver, or a malignant neoplasm, the former being in accordance with pure organic architecture, and held in restraint by laws looking to that end; the latter being the result of the same vitality, less the controlling influence that makes for the general good. This conception of the origin of neoplasms is in complete harmony with the cell theory, and has to do with causes active within the body, essentially **intrinsic;** but we cannot exclude **extrinsic causes,** those active outside of the body.

Mechanical irritation with its attendant phenomena of disturbed nutrition, is too frequently associated with the development of some malignant new growths, for the relation to be regarded as purely accidental. The liability to squamous epithelioma—carcinoma—of the arms of workers in paraffine and tar; the prevalence of epithelioma of the scrotum found among chimney-sweeps; the frequency with which cervical epithelioma follows inflammation and glandular hyperplasia of the cervix uteri, and the not unusual development of cutaneous growths into the most malignant neoplasms, as the result of local irritation, possibly infection, are too certainly matters of record to be disputed, or disregarded.

It is not contended that mechanical irritation alone is sufficient to cause a neoplasm, but it is more than probable that in association with forces generated within the body, mechanical irritation furnishes the necessary stimulus for the proliferation of dormant pathological cells.

Still another phase of the theory that extrinsic forces are concerned with the pathogenesis of neoplasms, is presented in **the hypothesis that parasites are an essential accompaniment of some malignant growths,** or may be the chief factors in their production.

That certain animal parasites—protozoa—are found in the growing edges of many epithelioma—carcinoma; and that certain vegetable parasites, and varieties of yeast exist in like relation to some connective tissue growths—sarcoma,—is well established, but at present it cannot be asserted that neoplasms are caused by parasitic infection, for parasites are not present in all neoplasms, and it does not appear that the new-growths in which they do occur, differ in any other respect from the neoplasms in which they are not present.

Moreover **the general action of micro-organisms upon cells** is to induce changes in the life of those already existing, and is not concerned with their proliferation; while the growth of neoplasms has to do with the numerical increase of the cell type that characterizes the beginning of the pathological new formation.

These parasites, as any other micro-organisms, may act as local irritants, and may even possess a more than ordinary perverting influence upon the tissues in which they lodge, they may even be the bearers of a special potency, by virtue of which their transplanting carries specific developmental powers, but we have not yet demonstrated them to be the cause of neoplasms.

The theory that **neoplasms have their genesis in embryonic, or remnant cells,** is more than a speculation, and brings to its support numerous embryological and anatomical data. According to this theory, during intra-uterine life cells or groups of cells are cut off from their sister cells, and ceasing to develop, remain as embryonic cells in tissues that proceed to mature development. These cells continue inactive until some stimulus, intrinsic or extrinsic, arises, that is capable of exciting their proliferating powers, for they have lost the capacity of work, and become vegetable, or proliferating cells.

Possessing no power of development, they begin to proliferate at the period of their history when segregation took place. Hence, according as this period was early or late in embryonic life, the resulting neoplasm represents a corresponding cellular type, and will be made up of more or less differentiated histological elements.

No hypothesis thus far advanced concerning the intrinsic origin of neoplasms is as widely applicable as this one of segregated fragments of germinal tissues, recent examination having demonstrated the existence of such fragments in every part of the body; more especially is this true of the genito-urinary system, and of those organs that present complicated developmental processes in embryonic life.

While the segregated embryonic cells may serve as the starting point for a neoplasm, they cannot be regarded as actually pathological until excited to activity. A question therefore of equal interest with that of the cellular genesis, is the systemic causes that late in life induce these cells to proliferate. Such must be concerned with the nutrition of the cell, and relate to hypernutrition, to overfeeding of the cell unit that possesses only vegetable functions, of cells that have parted with their power of development, and evolution.

What these conditions are we cannot always say, but apart from local irritants, either mechanical, or caused by micro-organisms, both of which have been referred to, **any dyscrasia, inherited or acquired, is capable, through perverted nutrition, of disturbing the natural equilibrium between the various elements of the tissue,—** "tissue tension,"—and liberating the inherent power of multiplication that each cell possesses. A dyscrasia will be a very potent etiological factor in the presence of embryonic remnants, between which there is an absence of equilibrium, and when normal "tissue tension" does not exist.

These two factors, segregated fragments of germinating tissue, and a dyscrasia, which is nothing else than some form of perverted metabolism, constitute **the relation that heredity bears to the development of neoplasms,** for the neoplasm must have its genesis in a cell or tissue that preserves its identity during the entire life history of the new growth, and a healthy mature organism cannot nourish abnormal cells, immature, embryonic cells, to such a degree as to induce their pathological proliferation.

Heredity occupies an insignificant position in the etiology of neoplasms of the uterine cervix, for if we distinguish between that which is inherited, and that which is congenital in pathological new

growths, we find that the forces that contribute to the transmission of the properties of germ plasms, though positive and of great strength, are operative within narrower limits than those that embrace the intra-uterine association of the embryo with the maternal tissues. The former are inherited, the latter are congenital, or acquired.

Individual existence begins at the moment when the nuclear material of the spermatozoön fuses with the ovum, and only **those properties are inherited that belong to the individual at the time of fecundation, or are produced by the interaction of the germ plasms that go to the building of the individual.** Any impression produced upon the ovum in utero must be from without, and received entirely through its relation with the maternal organ, and is subject to the inherent protective forces of the race individual.

In connection with the state of the fœtus at birth, it is a significant fact that the higher class of animals, —mammalians,— depend for a varying length of time for the development of their offspring, upon retaining most intimate physical relations with the parent. This is undoubtedly for the perfection of the individual, and for the development of the ancestral properties that characterize the ovum, but is it not also a period in which physical and mental characteristics are stamped upon the developing individual, and are not many pathological new formations, and developmental defects dependent upon irregularities of nutrition that occur during antenatal life, within the period that extends from fecundation to uterine birth? During the nine months of human gestation the mother is subject to many vicisitudes and influences that serve to mould and characterize the embryo and fœtus. **Thus originate congenital, or acquired defects,** that may appear in the embryo as an imperfect blastodermic differentiation, or organic segmentation, and later constitute foci for pathological cell proliferation.

That the germ plasma contains vicious properties which may be conveyed to the individual, we unfortunately have too positive and frequent demonstration, but such properties represent the sum of the vital processes of the parent, and not recently acquired characters, which are unstable, and the first

to be lost, the older properties being more stable, and there-
fore more certainly represented in the germ plasma. Such
stable properties as go to make up the constitution of the
parent, are capable of transmission. If they are in the line of
health the offspring is developed according to the laws that
preserve the highest type of the species; if the properties are
vicious, the results are developmental defects and reversion
to the structural forms through which the organism has passed
in the attainment of its present stage of evolution. A parent
does not transmit to his children, insanity, epilepsy, mental
and physical deformities, but the tendency to retrogressive
changes. **Pathology, therefore, that has its genesis in the ante-natal
period, is the sum of inherited, and of acquired influences,** the latter in
many instances counteracting the former.

In such controlling influences, as well as those exerted by
the germ plasma of the opposite sex at the moment of im-
pregnation, we recognize conditions that overcome vicious
tendencies, and prevent their development. Otherwise, dis-
ease would be more prevalent than it is, and developmental
defects more frequently perpetuated, for alone, and without
attrition, which always develops strength, organisms tend to
degenerate, and defects capable of transmission through the
germ plasma may have their genesis in forces operative at
the fusion of the nuclear material of the germ cells.

If through circumstances but slightly understood, as the
laws of breeding, the germ and sperm cells are not comple-
mental at every point at the moment of fusion, such points re-
main unsatisfied, having failed to be touched by their essential
vitalizing principle, which evolves functionating powers. **Such
points thus become foci of embryonic cells, and later of lawless cell pro-
liferation, the nature of the pathological process being determined by the
uncomplimented vicious properties that one parent transmits to the ovum.**

The Effect of Neoplasms is local, remote, and systemic.

The Local effect of neoplasms will be influenced by the character
of the new growth, whether it is malignant or non-malignant;
and will also vary according as its size causes pressure symp-
toms, or its potency is active in inducing changes in contigu-
ous structures. The local effect of non-malignant neoplasms

is mainly mechanical, and has to do with interference with function by reason of pressure. A cervical tumor may from its situation press upon the bladder or rectum, or pelvic circulation, or impinge upon nerve filaments, and so give rise to pain. Even the protective zone of inflammatory reaction already alluded to, that a benign growth develops, may from the same cause prove a source of suffering. With malignant neoplasms, in addition to mechanical pressure, the local effects are destructive of tissue continuity, and tend to advance the pathological process by a peripheral addition of specifically altered matrix cells.

The Remote effect of neoplasms is concerned with their reproduction at points more or less removed from the primary focus of disease. These secondary growths are in construction essentially similar to the parent neoplasm, and can always be recognized as belonging to the same cellular type, and tissue form. **Reproduction is accomplished by means of the lymph,—epithelioma,—and vascular channels,—sarcoma,—**the specific cells travelling through them to their place of lodgment, and subsequent proliferation.

The pathological interest of the remote reproduction of the neoplasms, lies in the embodied fact, that the cellular elements of new growths, even though transferred to a new matrix, possess no power of growth, or further evolution, their activity still continuing to be exhibited in excessive proliferation; and in the further demonstration that the conditions which stimulate activity at the primary focus have become general, for there is no reason to believe that metastatic cells do not pass into the circulation prior to the period when they find conditions favorable at remote centres, for their aggregation, and neoplastic tissue building.

The Systemic effect of neoplasms is a subtle question, for it deals with the constitution, a factor difficult to define and uncertain in its make up, in as much as it is the individual sum of the intrinsic forces that constitute a separate existence, and differs in just such measure from every other individual.

The effect that neoplasms produce on the system is of the nature of a toxæmia, though so far this has eluded analysis. The poison, generated in the metabolic laboratory of the path-

ological new formation, is disseminated throughout the organism, attacking the vital processes that maintain nutrition. Shall we not call this a ptomain, and the cachexia thus induced ptomain poisoning? Upon what other ground do neoplasms destroy life? Local necrosis, and degeneration of the neoplasm, with consequent absorption of noxious matter, while they may contribute the elements of septicæmia to the general picture, are not in point of frequency or time of development, sufficient to account for malignancy, for the system commonly gives evidence of intoxication quite independently of retrogressive changes in the new formation.

Neoplasms are subject to much the same processes that develop in tissues normal in extra-uterine life, with this marked difference, that the inflammation of new growth shows no disposition to reconstruction; it is not a healthy process, the object of which is to repair, but one that ultimately ends in progressive pathological changes, and destruction. It may be questioned whether any inflammation, other than septic, the result of bacterial infection, can develop in neoplastic tissues; certainly the arrangement of blood vessels, illy defined, and without definite boundaries, is opposed to the process, but if the growth itself is not the seat of inflammation, the surrounding cellular tissue, and possibly the outermost zone of neoplastic cells, mingled as they are irregularly with matrix elements, frequently give the appearance of general involvement.

Fatty metamorphosis is perhaps the most common change to which neoplasms are subject. It attacks all varieties, but more frequently highly cellular growths like the sarcomata. It is similar to the retrogressive process of healthy cells, and is a true degeneration. If the degeneration involves all parts of new growth, it may contribute to self-destruction.

Mucoid degeneration is also frequent, and attacks both epithelial and connective tissue cells. It is a true degeneration, leading to the transformation of tissue into mucus. When as the result of deficient blood supply this change occurs in the central part of a neoplasm, especially fibro-myoma, and sarcoma, cavities are formed filled with mucus. These are not true cysts, in as much as they are without a lining wall.

The process may take place at multiple points, and the new growth be almost transformed into a mass of cysts.

Colloid degeneration is confined to epithelioma, and of these more narrowly, when the neoplasms arise from columnar epithelial cells. So far colloid degeneration is unknown in squamous epithelium, and it is more likely to occur in chronic, than in rapidly growing epithelioma. The colloid substance is an albuminous homogeneous mass, containing few cells, and is rather a rare form of degeneration. When it does occur, the destruction of the cell is so complete, as to leave little of its original epithelial structure.

The Classification of neoplasms possesses an academic, rather than a scientific, or practical value, for it neither increases our knowledge of the pathogenesis, or history of new growths, nor does it materially aid us in their treatment, for it is very evident before we are able to classify a neoplasm; before we can place it with others of its kind, we must know all there is concerning it, and this will be obtained from individual diagnosis, not from classification.

The chief value derived from the grouping of neoplasms concerns the relation we establish between structural forms, and a positive clinical history. For example, a certain tissue construction is characteristic of epithelial neoplasms, and these are known sooner or later to develop conditions that undermine health and destroy life; and an equally characteristic construction belongs to connective tissue neoplasms, not all of which possess such a potency. When, therefore, we have placed a neoplasm in one of these anatomical groups, we have gained some general knowledge that will aid in making a prognosis, and will assist in forming a basis for treatment, whether it shall be radical, or conservative; operative, or expectant.

Two principal grounds have been proposed for the classification of neoplasms, the Anatomical, and the Clinical. Neither is wholly satisfactory, for some new growths represent a complex construction, thus confusing the strictly anatomical conception, while the frequent development of malignant from non-malignant growths, blurs the line that would otherwise classify neo-

plasms according to their life history. The stability of anatomy, and the invariable law that cells "breed true," however, speak in favor of the anatomical basis for the classification of neoplasms.

The embryonic differentiation of the blastoderm into three layers, epiblast, hypoblast and mesoblast, continues unchanged during the life of the individual, so that in adult organism, the origin of a tissue can be fixed with certainty. This absolute impossibility of confusion in cell genesis, or of epithelial,—epiblastic; endothelial,—hypoblastic; or connective tissue,—mesoblastic cells ever developing other than their kind, furnishes the most trustworthy data for grouping neoplasms, for while some new formations are composite, containing elements from all the blastodermic layers, it can usually be demonstrated that the morbid process began in one of these tissues, involving secondarily the others that go to make up the mass of the neoplasm. This primarily involved tissue moreover, commonly predominates, and its morbid proliferation, and arrangement characterize the neoplasm.

Neoplasms therefore are Connective tissue, mesoblastic ; and Epithelial, epiblastic or hypoblastic, according as they originate in the cells of one or the other of the blastodermic layers.

Connective tissue neoplasms are derived from the cellular descendents of the mesoblast. This, the middle layer of the blastoderm, though when finally differentiated is histologically distinct, and remains so throughout life, is formed at a point where the epiblast and hypoblast fuse in the primitive streak, and therefore it is conceivable that the cells of this embryonic layer may be endowed with some of the properties that possess the first and second germinal layers at the time of fusion. This origin of the mesoblast may explain the resemblance that some connective tissue neoplasms bear to epithelial growths, and may have given rise to the belief that the embryonic layers do not preserve their identity, and that epithelial cells may develop from connective tissue elements. Such a transition has never been known to take place, the cells remaining absolutely distinct from each other throughout all the phases of their proliferation and growth.

Connective tissue neoplasms are simple in construction, a single tissue element contributing to their make up. They are composed of mesoblastic cells arranged without order, and without organic design. There is no structural attempt to reproduce normal parts, and their anatomical interest consists in the variety of connective tissue cells of which they are composed, but chiefly in the lawlessness of their grouping.

Mesoblastic neoplasms partake of the character of the tissue in which they develop, which may be any structure containing connective tissue. There are thus developed:

A.—Fibroma, made up of fibrous tissue, varying in consistency from a hard, almost gristly mass, to a soft, translucent structure, rich in cells but poor in fibrous bundles. Such growths are encapsulated, and sharply defined from the surrounding tissues. The hard tumors contain few blood vessels, the circulation being carried on mostly through arteries that run immediately beneath the capsule. Hence the liability of these growths to central degeneration, the result of imperfect blood supply.

B.—Fibro-myoma—Leiomyoma, composed of unstriated muscle fibres, and scanty fibrous tissue, are found almost exclusively in the uterus, and make up by far the largest proportion of uterine tumors. They also have a distinct capsule, beneath which the nutrient arteries are situated. Both fibroma and fibro-myoma are invariably innocent growths, but that they may develop malignancy by insensible gradations of cellular retrogression through repeated recurrence after removal, the clinical history of "**recurrent fibromata,**" gives frequent proof; and that the primary tumor may serve as a focus for cellular degenerations entirely incompatible with health, possessing the potency of malignancy, is unfortunately but too frequently demonstrated.

C.—Myxoma, not as a degeneration of fibromata, but as a true neoplasm; *Lipoma; Chondroma; Osteoma;* and *Myoma,* a neoplasm composed entirely of muscular tissue—*rhabdomyoma,* striated muscle fibres, *leiomyoma,* unstriated muscle fibres.

D.—Sarcomata, constitutes the remaining large group of connective tissue neoplasms. From a clinical standpoint they are

of the first importance, for they possess a high degree of malignancy, and metastatic growths form an early feature of their development.

The sarcomata are characterized by predominance of round, or spindle-shaped embryonic connective tissue cells, representing phases of intra-uterine development.

The sarcomata have a very wide distribution, for they are met with not only where mesoblastic tissue predominates, but also in organs and structures in which it occupies a minor and secondary position. In such locations the proliferating connective tissue cells entirely displace the normal epithelial cells, and the organ, for example the mammary gland, which is principally derived from the epiblast, becomes converted into a mass of neoplastic connective tissue cells.

Epithelial neoplasms have their origin in the two layers that grow from Rauber's embryonic convolution, the epiblast, and the hypoblast. Though these layers serve in the adult somewhat different purposes, they have a common derivation; as a tissue they have a similar construction, and their pathological processes are sufficiently alike to warrant their discussion as epithelial neoplasms. Hence, epiblastic, and hypoblastic, or epithelial and endothelial new growths will be considered as epithelial neoplasms, the situation of the growth indicating with accuracy its histological genesis.

The essential construction of epithelial tissue, is an investing layer composed of cells joined together by a cementing substance, and possessed of no blood vessels. The layer of cells may be single, or stratified, smooth, or recessed, but everywhere it rests upon a basement membrane of connective tissue, which it serves to protect.

Epithelial Neoplasms follow in lawless confusion the structural plan of physiological tissue, but inasmuch as the connective tissue basement membrane becomes a part of the pathological process, the neoplasm as a whole is complex, being built of epiblastic and mesoblastic elements, epithelial, and connective tissue.

The manner in which these tissues are interwoven, the variety of epithelial cells involved in the pathological process, and the arrangement of the cells, furnish a basis upon which

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rest certain well-defined epithelial new growths, possessing distinct structural forms, with corresponding easily recognized clinical histories. Here again the anatomical basis simplifies classification.

There is no adequate reason, save that of usage, for retaining the terms, cancer, or carcinoma to designate these, or any other neoplasms. They can claim neither scientific accuracy, nor picturesque truthfulness, for they convey no meaning of pathological structure, nor do they define the clinical history, or describe the appearance of the growth. But few new formations present the slightest resemblance to a crab, and if we retain the terms we had better apply them arbitrarily to all malignant growths, connective tissue, and epithelial, making cancer, and carcinoma—the root of derivation being the same—synonymous with malignancy. Far better however to eliminate as much as possible descriptive terms from our nomenclature, as without place in modern scientific thought.

A distinctive feature of all epithelial new growths, is the variety of epithelial cells that go to make up the neoplasm. The cell as the initial potentiality gives character to the entire structure, and determines the location of the growth as well as its individual history. We will therefore consider epithelial neoplasms under divisions that correspond to the epithelial cells that predominate in their construction, but at the same time we will recognize that a certain degree of mutability of type must be allowed between the members of the same anatomical group, and hence a neoplasm may contain transitional cells, columnar epithelium under irritation showing characteristics that belong to squamous epithelium, and rapidly proliferating columnar cells resembling spheroidal epithelium. But such changes are entirely dependent upon local causes, the latter being removed, the cells revert to their permanent type.

Squamous-celled epithelioma is of frequent occurrence, and is usually met with in transitional regions, as the orifices of the body, where one variety of cells gives place to another. This variety of epithelial neoplasms always degenerates from its central parts, presenting an excavated ulceration.

Columnar-celled epithelioma, is especially associated with the epithelium of gland ducts. These neoplasms show a rude attempt at gland construction, that is, they are composed of groups of epithelial cells resting upon a vascular, connective tissue stroma, but in this arrangement the resemblance to glandular tissue is not carried to a perfect structure, there is an absence of a true secreting apparatus, the columnar cells are massed without order, and with no more design than is manifested by the first stages of gland formation, in which there is an inchoate interpenetration of epithelium, and connective tissue. Columnar-celled epithelioma is associated with the secreting structure of glands, and therefore represents more clearly the glandular type. There is however an entire absence of secretion, the cells not breaking down as in the normal performance of function. This form of epithelioma becomes in portions very dense, hence it has obtained the name of *scirrhus*.

An epithelial neoplasm possesses malignancy in the highest degree. This malignancy is characterized by an invariable metastasis by means of the blood channels, and the lymphatics; a tendency to return *in loco* after removal, and such profound interference with metabolism as to induce a fatal degree of systemic malnutrition.

Being in intimate relation with its connective tissue stroma, the neoplastic focus widens itself by destroying the structures with which it comes in contact. The pathological process therefore is not limited to epiblastic elements, but includes mesoblastic structures as well.

Agreeable with an anatomical basis for neoplasms, we have:

Group I. Connective tissue—*mesoblastic*—**neoplasms of the Uterine Cervix.**

Group II. Epithelial tissue—*epiblastic*—**neoplasms of the Uterine Cervix.**

Group I.

Connective tissue Neoplasms of the Uterine Cervix.—Neoplasms of the uterine cervix that have their genesis in the third blastodermic layer, fall into two classes:

1. Fibro-myoma. 2. Sarcoma. With subdivisions, according as one or another of the tissues that go to make up the new growth predominates, these two classes embrace all the connective tissue neoplasms that develop in the lower segment of the uterus.

1. **Fibro-myoma of the uterine cervix is composed of fibrous and muscular tissue, and is an atypical tumor,** developed in the cervical wall. As the lower segment of the uterus is poor in muscular tissue and rich in areolar fibrous tissue, the neoplasms found in this situation are correspondingly constructed. They are for the most part made up of fibrous tissue, and may be regarded as fibroma, but the presence of muscular tissues can always be demonstrated. The gross character of fibro-myomata is a reproduction of the uterine walls in which they are situated.

When muscular tissue—unstriated muscular fibre—predominates, the growth—**leiomyoma**—is soft, of reddish color, and consists of elongated muscle cells, each with a single rod-shaped nucleus and finely granular protoplasm. Upon section the muscular fibres are seen to pass in various directions in the plane of the section, being plaited and interwoven with characteristic irregularity. Leiomyomata consist essentially of unstriated muscle tissue, and are surrounded by a well defined fibrous capsule that binds the bundles of muscle together.

The vascular circulation of the neoplasm is carried on almost exclusively by means of blood vessels situated immediately beneath the capsule, and by a few blood spaces in the growth itself, which communicate with these channels.

Leiomyomata are prone to calcification, in which case the entire neoplasm becomes entirely hard. They are invariably innocent, though they may give rise to hæmorrhage, which proceeds from the mucous covering, rather than from the growth itself.

When fibrous tissue predominates in fibro-myoma of the uterine cervix, the tumor is composed of glistening wavy whitish bands of tissue, passing in every direction, but with a tendency to form "*whorls*" around individual centers. Fibromyomata vary greatly in consistency from a soft pinkish-white growth,

to a gray, almost cartilaginous growth. It is characteristic of fibro-myoma, that the freshly cut surface is uneven, the softer muscular bundles bulging between the dense fibrous tissue.

A firm capsule is formed from the matrix tissue, which varies in thickness with the portion of the cervical wall from which it is developed. Between the capsule and the tumor there is a layer of loose connective tissue in which the principal blood vessels that supply the neoplasm lie. These vessels, both arteries and veins, are unusually large, but do not penetrate far beneath the periphery, nor do such irregular spaces between the cells bear more than a slight resemblance to blood channels. They are usually without walls, but when such exist, they are composed of scanty fibrous tissue lined with cells that bear no likeness to an endothelium.

With an increase in the proportion of fibrous tissue there is a corresponding increase in the density of the growth. The blood supply is in consequence scanty, and the circulation slow. The pressing together of the blood spaces is connected most intimately with the processes of destruction and necrosis that frequently attack these growths.

Fibro-myomata of the uterine cervix are rare, and although they may develop in any portion of the lower segment of the uterus between the internal and the external os, **their most usual seat is in the upper part of the posterior wall.** In this situation they may be sub-mucous, or sub-serous, but most frequently interstitial. If sub-mucous, the development is in the direction of the cervical canal into which the tumor projects, covered with its mucosa. As these growths increase in size they are pushed downwards, and if they have originated near the os internum they subsequently present at the external os, sometimes pedunculated, at others sessile, depending for their nourishment upon the attachment they maintain with the matrix tissue.

It occasionally happens that the focus of new formation remains small, and being completely separated from the point of its development, emerges from the external os in an envelope of mucous membrane—**cervical polypus.** After passing the mouth of the uterus the growth assumes various shapes according to the pressure exerted upon it, retaining however this

characteristic, that the fibro-myoma occupies only the portion of the growth most remote from the point of origin, the intervening tissue being an extension of the cervical mucosa, which constitutes its pedicle.

Sub-serous fibro-myomata of the uterine cervix, have their origin in that part of the cervix that is covered with peritoneum. Such growths developing in the posterior section of the cervix will press upon the rectum, and if irregular in contour, dissect between the peritoneal layers of the broad ligaments, causing serious obstruction to the pelvic circulation.

Interstitial fibromata pursue much the same course. They may attain such size as to obscure the uterus, distort the os and cervical canal, and cause prolapsus of the uterus by filling the pelvis, thus forcing that organ downwards. Such growths menace health by pressure upon the pelvic vessels and neighboring organs, and present formidable problems in surgical therapeutics.

The Etiology of Fibro-myomata of the Uterine Cervix is intimately associated with defects in cell differentiation that date from embryonic life. Developmental irregularities of the uterus, ovaries, and Fallopian tubes frequently coexist with fibro-myomata, but there are no data to show that these bear more than a casual relation to each other, or that they are effects of the same pathological potency. The function of the uterus and of the generative organs is closely related to the genesis of these neoplasms.

It is an established fact that those organs having a complicated embryology; that result from the coalescence of primative structures, and mature by the absorption of primordial parts, are especially prone to the development of neoplasms that structurally represent some phase through which the organ has passed during intra-uterine life.

We have seen that the uterus is formed by the fusion of the Mullerian duct within the genital cord, and that its perfect form is accomplished by the disappearance of the septum of the mesial walls. The Wolffian duct occasionally remains as a vestigial organ in the lower segment of the uterus, where it is without purpose in the human female—it persists normally

in the sow—having no connection with the reproductive function.

The pathological significance of these embryological data centers around the fact that the Wolffian duct is an epiblastic invagination, while Muller's duct is a mesoblastic invagination into the intermediate cell mass. There is therefore in the lower segment of the uterus—a distinctly mesoblastic structure—a vestigial epiblastic structure. This structure is functionless, and possesses only a pathological importance, of especial interest in connection with the development of epithelial neoplasms of the uterine cervix, and of the inclusion of epithelial cells in fibro-myomata.

The etiology of fibro-myoma of the cervix, in-so-far as these tumors have their genesis in sequestrated fragments of germinating tissues—and modern pathologists favor such an origin for most anomalies of this kind—is primarily concerned with Muller's duct, and the phases through which it passes in the evolution of the genital canal. It may further be stated as the result of repeated demonstrations, that the cell "rests" found in the walls of the cervix, and that serve as starting points for the development of connective tissue neoplasms, represent stages in the physiological evolution of the uterine musculature, and consequently the varieties of these growths, the atypical character of which resides chiefly in the arrangement and grouping of their cells, have their counterpart in periods of normal intra-uterine development. We are thus able, for example, to refer leiomyomata of the cervix to the fourth month of intra-uterine life, at which time embryonic muscle cells begin to appear in close relation with the intra-mural blood vessels.

This is a period of intense activity in the evolution of the uterus. The septum is not yet completely absorbed, and the musculature of the uterus begins its development, for Muller's duct possesses no true muscular investment. The rapidity with which these processes take place, almost invites the cutting off of small groups of cells from the general mass, which proceeds to normal development, and also favors the lawless maturing of cell bodies.

Recent research furnishes abundant proof that many fibro-myomata of the uterus develop around the arteries as the re-sultof endarteritis, by means of which the embryonic muscle cells are forced away from the artery, and become seques-trated in the surrounding cell mass. A like process may occur during extra-uterine life, when the sequestrated fragments con-tain endothelial cells; but neoplasms developing under mature conditions will not present embryonic cell types.

In some fibro-myomata there are found epithelial elements. These can be regarded in no other light than as epiblastic inclusions, or "rests," in a mesoblastic matrix, and may indirectly origi-nate in the rapid growth and excessive proliferation of the muscle cells, by means of which unicular glands of the mucosa which normally project into the muscularis are constricted, and finally freed from their outer attachment, thenceforth becoming centers of epithelial proliferation. Fibro-myomata contain-ing epithelial elements derived from this source will conform in type to the later intra-uterine period of mesoblastic develop-ment, in as much as the ingrowths of epithelium that constitute the simple glandular bodies of the cervix, do not begin until about the sixth month. It is therefore conceivable that fibro-myomata of mixed structure, may assume such characteristics during post-embryonic life, the initial pathology being of mesoblastic origin. The remnants of the Wolffian ducts may also be responsible for some of the epithelial "rests" found in connective tissue neoplasm of the cervix,—this has been re-ferred to,—but such an etiology is more especially concerned with the neoplasms that have their genesis in epithelial structures, and in which the connective tissue is a secondary development—the epitheliomata.

The function of the lower segment of the uterus, though less pronounced than that of the corpus, as it does not enter so actively into either the process of menstruation, or of pregnancy, manifests periods of activity and rest, that cor-respond to cell proliferation, disintegration, and renewal. The uterine cervix also participates in the physiological hy-pertrophy of pregnancy, in which the muscular elements are enormously increased, subsequently diminished in volume,

and gradually shrink to their former condition. The line dividing this histogenetic cycle from conditions that either represent the physiological process carried to an excessive degree, or an arrest of one of the stages by which involution of the uterus is accomplished, may become obliterated by any circumstances that lead to cell hyper-nutrition, or that interfere with the uniform physiological retrogression of muscle cells and connective tissue, that precede the period of uterine rest.

Apart from general conditions that are always to be reckoned with in pathological new formations, any irregularity in the functional activity of the reproductive organs is capable of setting in motion such changes in the available cell nourishment, as may result in the retention of permanently proliferating foci of muscle cells, and other connective tissue cells, in a matrix that has proceeded to perfect involution.

Every impregnation, and in a lesser degree each menstruation, is accompanied on the part of the uterus with an attempt at the preparation of its walls, and mucosa, for the reception and care of an embryo. An arrest at any one of the stages of this rather intricate function, leaves imperfectly developed cells to be disposed of by the processes that tend to destruction, not construction; processes that stimulate the proliferating, rather than the functionating properties of cells. Hence an anomalous menstruation, miscarriage, or an abortion, or an imperfect uterine involution after full term delivery, may be factors in retaining cells in the structure of the uterus; proliferating cells that remain over after the mass of tissue has accomplished involution.

Though possibly in a minor degree, the uterus participates in the sexual orgasm. The lower segment especially suffers congestion, and a true erection. Excessive sexual indulgence, ungratified sexual desire, or incomplete coitus—a most injurious means taken to prevent conception—may be regarded as among the causes capable of stimulating irregularly the cellular structures of the uterus, and cervix, and so favoring abnormal cell proliferation, and the retention of erratic histologic elements in the uterine wall.

The conditions of life favorable to the development of fibro-myomata of

the uterine cervix, are similar to those that influence their appearance in other parts of the uterus, and will relate principally to age, and the social state.

Fibro-myomata of the uterus belong to the late period of reproductive activity, their appearance before the thirtieth, and after the fortieth year of life being quite unusual. The time of their development will thus be seen to correspond not only to the mature organ, but to the period when it is beginning to prepare for the inactive and functionless structures of the completely involuted organ, a period in which misdirected energy may stimulate embryonal "rests" to activity, or leave behind centers of abnormally proliferating cells.

There are no data to support the belief that the menstrual function bears more than a casual relation to the development of fibro-myomata. They are liable to increase immediately before menstruation, but when this obtains there is a corresponding decrease in size, the growth returning to its former proportions at the close of the function.

It has been observed with sufficient frequency to suggest a more intimate relation than that of coincidence, that menstruation is established early in women who later develop fibroid tumors of the uterus. When such is the case, possibly the sequestrated structures are in close relation with the uterine mucosa, and hence favor congestion of the endometrium, or more likely the tumor is an expression of developmental defects that include the ovaries, and incite them to abnormally early maturity.

The climacteric is commonly held to exercise a curative action upon fibro-myomata, and instances are reported of their complete disappearance after the menopause. It is however difficult to fit our present knowledge of morphology, and the processes by which cells proliferate and live, with such a clinical history. I do not now refer to the absorption of these growths that may follow their disintegration, and is liable to occur quite independently of the climacteric, but to the removal of the neoplasms as the result of the folding up of menstruation. Cutting off of the blood supply to the uterus that accompanies the menopause, may interfere with the nourishment of the tumor,

but this would result in necrosis, and if the tumor is so removed, it is by a process of gangrene, and sloughing. More commonly the neoplasms remain undisturbed by the change of life, though they may seem smaller as the uterus contracts and its elements are removed by involution.

A large proportion of the fibro-myomata tabulated have been found in married women, but this fact does not establish that of necessity the married state exercises such a preponderating influence in the development of these tumors. Many more married than unmarried women are examined, both for pelvic diseases, and in connection with pregnancy. Therefore our knowledge of the virgin uterus is comparatively limited, and tumors may remain undiscovered, that in married women would be readily recognized.

Indirectly pregnancy influences the development of fibro-myoma of the uterus. The neoplasms seem to be more frequent in women who have borne children, especially in multipara when child bearing has been rapid, and in consequences involution of the uterus imperfect.

Social position apparently bears no relation to the development of fibro-myomata of the uterus. These tumors appear with equal frequency in women who lead a life of luxury, and those who lead one of hardship. The African race is known to develop fibro-myoma of the uterus more frequently than women belonging to the Circassian races.

The Clinical History and Symptoms of fibro-myoma of the lower segment of the uterus will vary somewhat with the situation of the growth, though clinically the divisions into interstitial, sub-serous, and sub-mucous tumors, save in their initial processes, are difficult to maintain, for the increase of tumors is in the direction of the least resistance, and as the neoplasm grows, its original location may become obscured, a tumor developing in the walls of the cervix soon reaching the peritoneum—*sub-serous*,—or in the mucous membrane—*sub-mucous*.

The most frequent form of fibro-myoma of the uterine cervix is that which develops in the posterior section of the canal. From being originally interstitial, its tendency of growth is in the direction of the surface of the uterus, and as it rises above Douglas's cul-de-sac, it becomes sub-serous.

While small it is commonly without symptoms, its discovery being accidental during an examination for some other condition. Because however of the narrowness of the bony walls, a tumor in this situation cannot attain any considerable size before occasioning symptoms due to pressure upon the pelvic organs. Pressure upon the rectum or the bladder will prevent thorough evacuation of the bowels, or cause an inability to retain the usual quantity of urine. Pressure upon the pelvic vessels will induce œdema of the lower limbs, and stasis in the veins of the pelvis. And pressure upon the nerve trunks will give rise to dull aching in the hips, and neuralgic pains in the anterior crural, and in the sciatic nerves.

As the growth increases the uterus is forced down into the pelvic outlet. The os is dislocated, and the cervical canal distorted as the solid tumor extends in a variable degree between the layers of the broad ligament, most frequently the ligament of the right side. The lower segment of the uterus which has been pressed against the symphysis pubes, is by the growth of the tumor wedged below the brim of the pelvis, in which position the mass remains immovably fixed. The vaginal fornix is then completely obliterated, and the os dislocated to such a degree that its situation is made out with difficulty. Or the tumor, the uterus being in acute anteversion, may rise out of the pelvis, stretching the vagina and carrying the os beyond the reach of the examining finger.

In some instances the growth increases backwards and downwards, effacing the posterior vaginal fornix as it comes to occupy the recto-vaginal septum, down to the perineum. The hollow of the sacrum is thus filled, and the consequent pressure on the rectum interferes with its function, and induces obstruction of the hæmorrhoidal veins. Hence obstinate constipation from inability to empty the rectum, and ultimately the development of hæmorrhoidal tumors.

As the fibroma increases in size it completely fills the vagina, the mass being covered with squamous epithelium as it approaches the vulva. The position of the os and distortion of the cervical canal, interfere with the free emptying of the uterus, and are the cause of obstructive dysmenorrhœa, with

its consequent mechanical dilatation of the genital canal
above the internal os. Sterility is present, both because of
the unnatural position of the os, and the obstacle to coitus
presented by the vaginal tumor.

Unless the tumor is in close relation with the mucous mem-
brane of the cervical canal, hæmorrhage will not be present,
as this connective tissue neoplasm does not bleed from its sub-
stance, but from its mucous covering, the vascularity of which
increases as the new growth approaches the surface.

Occasionally fibro-myoma develops, in the anterior wall of the cervix.
The growth then bears the same relation to its matrix as
do the tumors that develop in the posterior wall, and is sub-
ject to like conditions of increase. In this situation they do
not commonly acquire any considerable size. As they grow,
they rise on the anterior aspect of the uterus, making press-
ure in the vesico-uterine space, and so interfere mechanically
with the bladder function. By this means the capacity of the
urinary bladder is reduced, and frequent urination becomes a
most distressing symptom.

Sub-mucous fibro-myomata of the uterine cervix arise in the
deeper layers of the mucous membrane, and soon encroach
upon the cervical canal. Being urged forward, they slip beneath
the mucosa to a point where they sever their connection with
the cervical walls, and are then often entirely surrounded with
mucous membrane. **By stretching of the mucous membrane the
tumor becomes pedunculated,** and appears as a polypus in the
uterine canal or at the external os. The neoplasm is then com-
posed of a mass of fibrous tissue, with isolated muscle cells
held in connection with the uterus by means of an elongation
of the mucous membrane, which contains its nutrient vessels
—the pedicle. While in the cervical canal the tumor is covered
with columnar epithelium, but as it passes through the os and
occupies the vagina, this covering is changed to well marked
squamous epithelium, probably due to friction and exposure.

Pedunculated fibro-myomata are very poorly nourished, and
are therefore subject to necrosis and sloughing. They possess
no true capsule except at their base, and hence are liable to
profuse hæmorrhage from injury to their thin walled vessels.

They also give rise to a profuse muco-purulent cervical ca-
tarrh, which becomes sanguineous, and fetid, as it contains
blood, and necrotic tissue. They are liable to cystic degenera-
tion, the cysts originating in mucoid softening, or in seques-
trated fragments of mucous glands. The former is the more
frequent process, ultimately resulting in œdematous degenera-
tion of the entire neoplasm.

Fibroid polypi unless the seat of degeneration, rarely attain a
large size. They hang from the cervix into the vagina, caus-
ing no discomfort, save that which arises from a knowledge of
their presence. More commonly however they become œdema-
tous, and rapidly fill the vagina. Hæmorrhage and sloughing
invariably attend such growths, and septic infection is liable
to ensue.

Polypoid fibromata of the cervix sometimes appear as small
tongue-like tumors—**mucous polypi**—that originate within the
canal, but early protrude from the external os. They are
smooth, bright red, and bleed upon the slightest touch. The
glands of the cervix enter into the construction of these
tumors, their stroma consisting of loose connective tissue. They
are especially prone to myxomatous degeneration, the full ex-
pression of which appears as a wholly œdematous growth.
They are liable to early necrosis and sloughing.

**Fibro-myoma of the lower segment of the uterus is subject to the
same retrogressive changes that take place in other situations.** Fore-
most among these is probably the **myxomatous degeneration,** in
which the ground substance of the neoplasm swells and be-
comes translucent by the absorption of fluid. This may in-
volve limited portions of the growth—the process intimately
associated with the formation of cysts—or it may affect the
entire connective tissue structure, when the tumor becomes a
jelly-like mass—**myxo-fibroma.** These growths appear as soft,
almost fluctuating tumors, that have increased rapidly, and
uniformly, unless multi-cystic. They remain encapsulated, and
show no disposition to break down unless destructive inflam-
mation proceed from the mucous covering, inwards, causes
necrosis of the underneath new formation.

Fatty degeneration is of rare occurrence; when present it is

probably an initial step in the spontaneous disintegration of the neoplasm.

Calcification of a fibro-myoma of the lower segment of the uterus is quite frequent, especially in the tumors in which fibrous elements predominate. The lime salts are deposited rather late in the history of the growth, and may occur at several points, or in one central mass. In the early stages of development the degeneration cannot be recognized, but later, the weight and hardness of a fibro-myoma that has run a chronic course without perceptible increase in size, would suggest calcareous changes. The degenerated neoplasm pursues an absolutely benign course, though prone to destructive processes, and consequent suppuration.

Cysts are of frequent occurrence in sub-serous, and interstitial fibro-myoma, rarely in the uterus, being traceable to any other origin than central degeneration of neoplasms of this class.

Myxomatous degeneration leads to circumscribed softening, and the formation of spaces filled with mucus that varies from a pale amber to a dark porter color, according to the extravasation of blood that has taken place. Cavities so formed are not true cysts, their walls are formed by the lines that mark the limit of the degenerative process, and their increase is accomplished only by a continuation of the myxomatous infiltration.

The shutting off of spaces, that in the early history of the growth served as channels for conveying blood or lymph, leaves cavities of irregular shape in the interior of the neoplasm. These cysts have no walls, but are limited by the fibrous and muscular tissue that compose the tumor. They contain a clear yellowish fluid, or blood in different stages of disintegration, and have been thought to arise in lymph channels by much the same process that results in closing the blood spaces. But such an origin seems doubtful, in as much as these cavities are not lined with endothelium.

True cysts, that is, cavities separated from their matrix by a distinct wall differing in structure from the tissue in which the tumor occurs, may arise from a hollowing out of the remains of the vestigial organ, the Wolffian duct, as it is found in the

walls of the cervix. Such cysts are lined with cubical epithelium, which establishes with considerable certainty their origin from unobliterated portions of the ducts. These vestigial organs are found in the sides of the lower segment of the uterus, and in this position the cysts that owe their origin to the remains of the Wolffian ducts, are situated. They are rather firm, being filled with atheromatous material, and may give the impression of a more or less solid growth, being rather difficult to distinguish from the fibroid tumor in which they occur.

True cysts are also formed from the isolated remains of strangulated glands of the cervical mucosa. This process has already been referred to, and consists in such an overgrowth of fibrous tissue as to sever the connection of the gland from the free surface. Such sequestrated fragments of glands are nests of columnar epithelium that retain their suggestion of function, but are unable to functionate. They are generally multiple, and develop near the periphery, though sometimes the utricular glands of the cervix penetrate deeply within the musculature, and contain mucus, the normal secretion of the epithelial cells that line the cyst wall.

With the introduction of germinating epithelial cells into a connective tissue matrix·of pathological construction, the histology becomes correspondingly complicated, and the construction of the neoplasm approaches dangerously near that belonging to malignancy, but nothing in the clinical history of fibro-cystoma, save that they may be observed to develop rapidly, and to vary in size, a characteristic of all cysts, serves to distinguish them from simple fibro-myoma.

The epithelium lining these cysts is of the columnar variety, and the plan of tissue construction that of the simple tubular glands. In proportion as the glandular arrangement reproduces more closely the normal tissue which is its prototype, the neoplasm partakes more of the character of the adenomata, and is appropriately termed **fibro-cystic-adenoma**, but throughout its course it remains encapsulated, and is not reproduced in remote parts of the body—non-metastatic.

Fibro-myomata of the uterine cervix are liable to necrosis and slough-

ing, processes that arise in deficient blood supply, mechanical irritation of their exposed surfaces, and the invasion of micro-organisms.

Molecular necrosis, which generally begins in the centre of the fibroid, is at times so extensive as to arouse the suspicion of malig-nancy; indeed, a positive diagnosis between epithelioma, ade-noma, and a sloughing fibroid of the cervix when first exam-ined, is often attended with considerable difficulty.

The tumor presents a bleeding, broken down surface, from which there is a foul sanious discharge. If of long continu-ance there will be present systemic involvement that closely resembles the cachexia of malignancy. But analysis will show this to be a mild form of septicæmia arising from local ab-sorption, differing from the gradual emaciation and evidences of imperfect metabolism, that make up the picture of malig-nant ptomain poisoning.

There may be enlargement of lymphatic glands, especially in the inguinal region, but this is not a metastatic growth, or a repro-duction of the primary cellular pathology. The diagnosis however does not rest upon clinical data alone, but should re-ceive the assistance of a microscopical test.

Though not malignant, in the sense that they possess a potency that antagonizes the healthy processes of the body, sub-serous fibro-myomata of the lower segment of the uterus are of serious import because their method of growth may render a most formidable procedure necessary to relieve suf-fering, and to remove mechanical obstacles to the performance of function. Fibro-myomata in this situation tend to advance in the direction of the pelvic cellular tissue, especially at the sides of the uterus, forcing apart the peritoneal layers of the broad ligaments even to their reflection from the bony walls. The pelvis may thus become filled with an extra peritoneal mass, firmly wedged between its walls, the removal of which involves extensive and deep dissection.

The possibility of fibro-myoma of the cervix becoming malignant, or more properly, becoming associated with malignancy, cannot be overlooked, for both sarcoma and epithelioma have been observed as a late stage in the history of this neoplasm. We

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are in possession of no data relating to the life history of cells
that would support a belief that embryonic connective tissue
cells develop from more mature muscle cells, or fibre cells,
but it is entirely in conformity with the histogenesis of con-
nective tissue, that during the process of inflammation, when
embryonic cells represent a normal stage of development,
certain of these cells cease to become functionating, and re-
main as proliferating cells, thus establishing a focus of imma-
ture tissue. It is also not unlikely that true embryonic con-
nective tissue "rests" are associated with, but quite independ-
ent of the muscular and fibrous new growth, and that under
the stimulation of hyper-nutrition, such centers assume active
development. Both of these processes lead to the develop-
ment of sarcomatous tissue, and may be carried on without
reference to the life of the neoplasms in which they take
place, and because of their rapid growth may ultimately al-
most entirely replace muscular and fibrous structures, thus
giving the appearance of a degeneration, while in reality the
change is brought about by an added pathological new
formation.

It is entirely inconsistent with the laws of "true cell breed-
ing," that a fibro-myoma can develop into an epithelioma in the
sense that epithelial cells have their genesis in connective
tissue cells, for the mutability of type is confined strictly to
the members of an anatomical group, and never extends to
the members of another group of cells. The transformation
therefore of a fibro-myoma into an epithelioma, must proceed
from changes in epiblastic cells that are encapsulated in the
connective tissue neoplasm, or otherwise placed in proximity
to it.

Embryonic epithelial cell "rests," or sequestrated reticular
glands, may give rise in fibro-myomata to a central epithelio-
matous development—a very rare occurrence,—more com-
monly the epithelial cells proceed from the epiblastic cells of the
mucous membrane and its glands, that covers the connective
tissue neoplasm. Epithelioma and fibro-myoma, are thus quite
distinct pathological processes, but the malignant course of
the epithelial growth soon overshadows and obscures the

connective tissue growth; hence, the clinical picture is pre-
sented of epitheliomatous degeneration of a fibro-myoma.

**Neither age nor conditions of life seem to be concerned in the malig-
nant degeneration of fibro-myoma of the uterine cervix,** but local irri-
tation, either from intra-uterine discharge, or the prolapsed
portion of the tumor that is subjected to mechanical injury,
are capable of inducing changes in the circulation, and there-
fore the supply of nourishment to the cells, that may result in
their overnourishment and consequent morbid proliferation.
Hence a large cervical tumor that fills the vagina and is exposed
to more or less continuous mechanical irritation, may be re-
garded as one that presents favorable conditions for the de-
velopment of epithelioma of the mucous membrane; and a
fibro-myoma that from one cause or another is the seat of in-
flammation, rather invites the formation of embryonic connec-
tive tissue cells, the essential elements of sarcoma.

The diagnosis of fibro-myoma of the uterine cervix is for the most
part unattended with difficulty. In the early stages, and while
small, the tumor rarely attracts attention, but after it has ac-
quired any considerable size its presence can scarcely escape
recognition. The entire lower segment of the uterus lies with-
in easy reach of the examining finger, enabling one to map
out the sub-serous, and mural growths, and the sub-mucous
tumors can generally be brought under observation with the
aid of a speculum.   The chief interest will center around
the diagnosis between these tumors and other morbid condi-
tions that develop in relation with the vault of the vagina,
and the uterine cervix.

Fibro-myoma occupies the posterior portion of the cervix.
When confined to the wall of the cervix, projecting back-
wards, and not encroaching upon the posterior fornix, vaginal
examination finds Douglas's cul-de-sac occupied by a mass
that is connected with the uterus, and movable with it.

A small organized pelvic hæmatocele—as long as the blood con-
tinues fluid it does not form a tumor—also presents a median
retro-cervical swelling, but while this may be tense, it feels
like a piece of liver, quite unlike the hardness of a cervical
fibroid.   There is usually a sulcus between the hæmatocele

and the uterine wall, a condition never found with a fibroid in this situation, and save in the median line, the effusion does not appear in direct contact with the uterus, but adapts itself more to the convexity of the rectum. This shape of the blood clot is especially marked in a rectal examination.

A small pelvic hæmatocele, much as it is liable to be mistaken for a cervical fibro-myoma, is not attended with the shock of sudden hæmorrhage, but there may be acute abdominal pain, and some local peritonitis, causing tenderness of the swelling, and pain upon defecation. If the hæmatocele does not increase rapidly, in the course of a week or ten days it will grow smaller, and firmer, and finally disappear completely; such physical changes do not belong to fibroid tumors.

A circumscribed inflammatory exudation into the cellular tissue behind the cervix, causes a swelling that may be confused with a fibro-myoma in the posterior cervical wall. The inflammatory tumor however will not extend below the supra-vaginal portion of the cervix, and therefore the posterior vaginal fornix will be but slightly encroached upon. The exudate is commonly unilateral, extending into one broad ligament, or encircling the cervix, while a fibro-myoma usually occupies the center of the cervical wall, and from there grows outwards, between the peritoneal layers of the broad ligament. Both the neoplasm and the exudate are extremely hard, but the characteristic well defined boundary of the former is placed in strong contrast with the indistinct outlines of the latter. With the exudate there is a history of probable infection, either puerperal, or instrumental, with chill, fever, and pelvic pain. These do not accompany a cervical fibroid. If the case comes under observation at a later period when all inflammation has subsided, and a history of pelvic cellulitis cannot be made out, the diagnostic marks between cervical fibroid and chronic pelvic exudate, may be very much obscured.

If the symptoms are not urgent, we may take advantage of time to assist in the diagnosis. Fibro-myomata change very slowly if at all, their tendency is to increase. Inflammatory exudate, if it does not break down into pus, progressively decreases in size, finally disappearing. This course is especially characteristic of non-puerperal parametritis.

Embarrassment may sometimes arise in distinguishing between a small irregularly shaped sub-serous fibro-myoma situated in the supra-vaginal portion of the cervix, and **pachysalpingitis in which the thickened tube and ovary have fallen into Douglas's cul-de-sac.** Both conditions form circumscribed hard tumors, nor does the close connection of the fibroid with the uterus here serve as a characteristic feature, for pachysalpingitis is early accompanied with peritonitis, that fixes it firmly in the recto-uterine pouch, and causes the thickened tube to move with the uterus. The uterine sound gives little assistance beyond showing that a swelling exists in the retro-cervical space, for with small cervical fibroids the canal is not distorted, or the uterus necessarily displaced.

Valuable information is elicited from a rectal examination. Subserous fibroids of the cervix are not usually accompanied with sufficient peritonitis to cause adhesions *ad loco*, while pachysalpingitis contracts adhesions with both uterus and rectum. With one finger in the rectum, and one in the vagina pressed firmly against the portio-vaginalis, the rectum can be made to slip over the growth if it is a fibroid, but will be found adherent to, and a part of the tubal swelling, which is usually very sensitive even in chronic cases. The absence of local sensitiveness, of a septic history, and of pelvic pains, will speak in favor of a cervical fibroid.

Catarrh in some degree commonly accompanies cervical fibroids, but is liable to be quite profuse and muco-purulent in salpingitis. There is nothing characteristic in the menstrual function. In both conditions there may be menorrhagia.

A small fibro-myoma in the Anterior Cervical Walls, presents few diagnostic difficulties. The tumor does not interfere with any function, the only condition likely to confuse the diagnosis being an abscess in the vesico-uterine cellular tissue, an exceedingly rare disease, and one made clear by the history of pus formation. Pain and involvement of the bladder accompany a pus focus in this location.

So far of small sub-serous, and mural fibro-myomata of the lower segment of the uterus. We have now to point out the diagnostic marks of the larger tumors, that become serious be-

cause of the position they occupy, the pressure they exert on pelvic organs, and the degenerative changes to which they are subject.

Fibro-myomata of the posterior cervical wall of the cervix, that extend into the recto-vaginal septum, lying between the rectum and the vagina, cannot be mistaken for any other condition. The curve of the vagina is lost by the pressing forward of the posterior wall. The posterior vaginal fornix is obliterated, and the os, if it can be made out through a speculum, presents as a small opening on the surface of the growth. More commonly the os is forced behind the pubis, beyond observation. Examination through the rectum gives the impression of the uterus extending to the vaginal outlet. Before the tumor has attained this size it may be possible to obtain a knowledge of its pelvic extension by means of a bimanual examination, but this is impossible when the vagina is filled with the neoplasms. We can then judge of the degree to which the neoplasm has burrowed in the cellular tissue, only by the pressure symptoms present. These will affect the action of the bowels, rendering free evacuations difficult and painful, and give rise to dysmenorrhœa, according to the degree of obstruction of the uterine canal. If the uterus is dislocated, there will be urinary tenesmus. When the neoplasm burrows between the layers of the broad ligament, pressure on the uterine plexus of nerves will induce pain in all the branches of the hypogastric plexus, and give rise to many reflex disturbances, through the sympathetic nervous system. The pain in the hollow of the sacrum, quite characteristic of diseases of the cervix, will be present.

Posterior cervical fibro-myomata, as they encroach upon the vagina, are covered with squamous epithelium, and their presence in the recto-vaginal septum excites both the rectum and the vagina to an abnormal degree of activity. Proctitis, with sanguineous discharge from the rectum, and vaginal leucorrhœa are frequent accompaniments.

Sub-mucous fibromata of the cervix, as long as they are situated within the canal, are small, and arrest attention chiefly by the bleeding to which they give rise. This symptom sug-

gests **an examination.** The os is found soft, patulous, and sufficiently open to admit the index finger. While the growth is sessile it appears as a circumscribed hard tumor directly beneath the cervical mucosa, which is freely movable over its surface. The entire mucous membrane of the cervical canal is unduly vascular, this character not being limited to the portion that covers the tumor. There is a profuse sanguineous cervical leucorrhœa, and an absence of the mucous plug that usually occupies the os.

A sub-mucous fibro-myoma does not long remain sessile, but is pushed forward in the form of a polypus, which protrudes from the os as a soft, highly vascular, elongated tumor. In the majority of cases the first symptom for which the surgeon is consulted is a slight, bloody, more or less continuous leucorrhœa, or a little bright blood following coitus. The significance of the latter symptom will be more especially referred to in connection with the diagnosis of malignant neoplasms of the uterine cervix.

Occasionally cervical polypi that are attached near the internal os, protrude from the uterus only during menstruation, being drawn up into the canal as the uterus contracts at the conclusion of that function. Hence the name, **"intermittent polypus."**

Vaginal examination shows the growth as described. The uterine sound usually discovers a rather irritable endo-metritis, and an elongated canal; the polypi are usually multiple, and associated with mural fibro-myomata of the body of the uterus, the presence of which interferes with the normal contraction of the organ after menstruation.

The diagnosis of a pedunculated fibro-myoma of the cervix that has attained a sufficient size to occupy the upper portion of the vagina, or to fill the entire canal, will largely rest upon the success with which the attachment of the growth is made out, and this may prove difficult because of the mechanical obstruction in the way of reaching the uterine os.

As the tumor occupies the vagina it assumes a shape in conformity with the space it fills, and hence the growth having lost the traditional elongated form of a polypus, presents a shapeless

mass of tissue that has undergone molecular necrosis, and is sloughing. There is a profuse, sanious, foul, and irritating leucorrhœa. The character of the discharge depends upon the breaking down of the neoplasm, and also upon the imperfect emptying of the vagina of menstrual blood.

The mass that lies in the vagina is easily destroyed and made to bleed by the examining finger, but it rarely contracts adhesions with the vaginal wall, though the canal may be denuded of its epithelium by the irritating discharge.

By forcibly insinuating the index finger between the vagina and the neoplasm, the pedicle, or attachment to the cervix is reached, and the nature of the growth established, for no other new formation of the uterus with which the cervical polypus could be confused, has a similar origin.

The constitution may become seriously involved as the result of absorption from the necrotic sloughing tissue in the vagina; there may also be marked anæmia from hæmorrhage, for there are usually multiple intra-uterine fibromata in conjunction with a pedunculated fibroid, that give rise to profuse menorrhagia. The condition may resemble cachexia, and our diagnosis will consider the possibility of malignancy.

Primary malignancy will be excluded, with the ascertainment that the growth is pedunculated, for none but benign growths of the cervix originate in this form. Epithelioma of the fungoid type may fill the vagina with a sloughing mass, but the entire cervix is involved in the neoplastic process, while in pedunculated fibromyoma the portio vaginalis does not participate in the morbid growth, and is connected with the polypus by means of a pedicle only.

The question of secondary malignancy will be concerned with metastasis, remote development, a certain feature of epithelial neoplasms, never seen in connection with fibroid growths. Clinically there may be observed in both diseases progressing defective metabolism, and wasting of tissues, but in one it is a true septicæmia emanating from a single focus, in the other it is a toxæmia, a chemical depriving the proteids of their organic compounds, from the secondary reproductions of the initial pathology. The special features of malignancy will be pointed out in the discussion of malignant neoplasms.

The Treatment of fibro-myoma of the uterine cervix, will vary according as the tumor is sub-serous, sessile, or pedunculated, but in any event it must fall within operative surgery, for no other treatment will avail for the removal of these new growths.

The effect of the climacteric upon the disappearance of fibro-myoma of the uterine cervix is so uncertain, that in the presence of their ascertained growth, we are not justified in adopting an expectant method of treatment upon the sole ground that the completion of the menopause will arrest the growth, or cause its disappearance. Quite as frequently a fibro-myoma takes on increased activity at the change of life, and grows rapidly after the reproductive organs are folded up. Therefore the presence of even a small fibro-myoma in the uterine cervix—I refer especially to the sub-serous, and interstitial varieties—bespeaks watchfulness on the part of the physician, and calls for radical treatment if there are indications of beginning activity in the neoplasm.

Both sub-mucous and pedunculated fibro-myoma tend to spontaneous expulsion, but it is a question whether they should not be removed as soon as recognized, in view of their very probable necrosis and sloughing. Fortunately the attending hæmorrhage generally leads to an early recognition, otherwise it is to be feared that they would more frequently be permitted to remain until destructive processes set in, with the consequent danger of septic infection.

A Small fibro-myoma of the posterior cervical wall may be enucleated through the external os. The tumor is more closely adherent to its matrix by fibrous bands than similar growths in the body of the uterus, but is well encapsulated, and can usually be removed from its connective tissue bed, through a vertical incision in the cervical canal. If the os is not sufficiently open to accomplish this, and cannot be dilated enough for the purpose, the lateral commissure of the portio-vaginalis may be split up to the vaginal vault, by which means the cervical canal, almost to the internal os, is brought under observation. Traction upon the anterior and posterior lips with volsella in the hands of an assistant, who at the same time separates

them widely, will greatly aid in exposing the field of operation. The function of the cervix is in no degree impaired if as a final operative procedure the incisions are sutured as in trachelorrhaphy.

A vertical incision in the cervical mucosa is made down to the tumor. The tumor is then seized with a small volsellum, and as it is incised, clipped from its bed, with curved scissors. By maintaining considerable tension on the tumor, the bleeding, which is never profuse, is controlled, and at the same time the risk of opening the peritoneum, or peri-uterine cellular tissue, minimized. The cavity left by the tumor is packed with iodoform gauze, which drains through the external os. After the first dressing, which should be made in twenty-four hours, the contraction of the cervix generally renders its repetition unnecessary. Intra-uterine douches of boracic acid, followed later with *Bichloride of mercury*, should however be continued for a week or ten days.

A fibro-myoma of the anterior uterine wall that has attained considerable size, may be removed through the anterior vaginal fornix without opening the cervical canal. The manipulation will be carried on through the vesico-uterine space—space of Retzus—and the chief anatomical concern will be in connection with the bladder which is in danger of being injured while separating the tumor from its connections; but the relation of the pelvic connective tissue with the bladder and uterus is much the same as when the pregnant uterus rises out of the pelvis, and hence there is considerable space outside of the peritoneum in which to work.

I prefer the patient in the lithotomy position, though if the vagina is capacious the anterior vaginal wall is well exposed for the operation, in the left lateral, or Sims's position.

The uterus is steadied with volsella, and the better to avoid wounding the bladder, an incision is made over the tumor before the uterus is drawn down. The vagina having been opened, by cutting towards the cervix the bladder is avoided, if the further dissection is carried on against the tumor.

After opening the thin covering formed by the cervical wall,

the tumor is reached and seized with a volsellum. If possible, its further separation should be accomplished with the finger, or the handle of the scalpel, or better still, a slightly curved periosteotome. The bladder wall is sometimes in direct contact with the anterior surface of the growth, and the utmost care will be necessary to avoid injury. The volsellum that holds the tumor should not be removed until its delivery is accomplished, for by traction bleeding is entirely under control. As the tumor is separated from below upwards, assistance will be rendered by drawing upon the uterus, which brings the mass down with it.

No attempt should be made to close the wound. Buried sutures cannot be used, and the walls of the cavity left by the removal of the tumor cannot be held in apposition because of the changing position of the bladder. The cavity will be irrigated with *Bichloride of Mercury*, $\frac{1}{5000}$, and lightly packed with iodoform gauze. The patient should be encouraged to empty the bladder at least every six hours. If this is impossible, the catheter may be used at the same intervals of time. It is advisable to pack the vagina with iodoform gauze, for the dual purpose of supporting the uterus, and of maintaining an equable pressure at the seat of the operation.

The operative treatment of a large fibro-myoma that originates in the walls of the uterine cervix, and there is no other method of dealing with these growths, involves anatomical propositions that may make it a most formidable procedure, or even render it wholly unjustifiable. In large tumors that fill Douglas' pouch, developing in the posterior wall, and lying in contact with the anterior rectal wall, that pass downwards into the recto-vaginal septum, and spread out between the layers of the broad ligament, the vaginal route alone is not to be considered. The growth can be reached only through an abdominal section combined with a vaginal operation, and its removal will necessitate a complete hysterectomy.

Hysterectomy, both abdominal and vaginal, inasmuch as it is an operation required for the treatment of several neoplasms, in order to avoid repetition, will be described in a separate chapter. Certain conditions, however, characteriz-

ing individual growths, serve to modify the technique, the better to adapt it to the case in hand.

In the present instance, a large dissecting fibro-myoma of the posterior cervical wall, we have to remember that the growth is extra peritoneal, both behind the uterus, and as it dissects between the layers of the broad ligament; and that in order to remove it with the uterus, we must get outside of the peritoneum to a greater extent than in an ordinary hysterectomy, and carry our peritoneal incision well on the posterior aspect of the broad ligament, from which point the tumor can be best enucleated. **Before beginning this part of the operation it is absolutely necessary to ascertain the exact location and course of the ureters,** and when the tumor occupies the greater portion of the broad ligament, it is safer to catheterise the ureters as a preliminary step in the operation, for these tubes may be so distorted by the growth, or embedded in it, that unless clearly defined as with a catheter, their injury is almost unavoidable.

The cavity remaining in the broad ligament may in the majority of cases be closed with safety, but when there is oozing from the torn surfaces, I find the best results to follow bringing the peritoneal layers together, and draining with iodoform gauze through the vagina, the abdominal opening being closed.

In some instances a cervical fibro-myoma that develops in the posterior cervical wall, may extend downwards into the recto-vaginal septum, not dissecting between the layers of the broad ligament. Removal of the uterus will probably be the only treatment available, especially if the tumor involves the posterior wall of the fundus, extending above the peritoneal reflection at Douglas' pouch, but until a satisfactory examination can be made, which is quite impossible when the vagina is filled with a solid tumor, the exact boundary of the neoplasm cannot be ascertained, and therefore we may proceed as if to enucleate the tumor, leaving the uterus in position.

Beginning as high in the vagina as possible, a vertical incision is made in the posterior median line, through the mucous membrane, down to the fibrous capsule of the tumor. This is then opened to the same extent as the initial incision, and the

tumor separated from its bed, first on one side, and then on
the other. If now the growth, having been also separated from
below, can be grasped and drawn downwards, the cervix will
be brought along with it, and the splitting of the mucosa, and
the dissection, carried on until the upper limit of the tumor is
reached. With a roomy vagina and a movable uterus, such a
procedure is possible, but at any step of the technique it may
be changed, and a complete removal of the uterus carried out.
If the growth fills the vagina, making it impossible by any
justifiable traction to reach the cervix, the tumor, after it has
been dissected from the rectal wall, may be ligated at its high-
est point, and vaginal hysterectomy proceeded with as in
ordinary cases.

A pedunculated fibro-myoma of the uterine cervix, when small, or
even when of considerable size, if the pedicle can be reached,
is removed without difficulty. The cervix is well dilated, and
traction made upon the tumor, by means of a clove-hitch of
heavy silk thrown around its pedicle. An elliptical incision
is then made in the mucosa, wide of the base of the growth,
and its efferent arteries ligated with cat-gut, after which the
tumor is cut off. It is well to bring the edges of the mucous
membrane together with a few interrupted cat-gut sutures.

Small mucous polypi may be removed by torsion, or may be ligated,
or crushed with the angiotribe. For this purpose, and for re-
moving hæmorrhoids, I have had constructed an *angiotribe*
with slightly beveled edges, thus avoiding unnecessary tearing
of the mucous membrane at the base of the tumor. Bleeding
from the incised mucous membrane is usually insignificant,
and ceases as soon as the sutures are in place, but should it
promise to be troublesome, before placing the sutures, hot
water, or better, Adrenalin chloride, $\frac{1}{1000}$, may be applied
for a moment to the oozing surfaces.

The obstacles in the way of removing a large pedunculated
fibro-myoma that fills the vagina, are, the difficulty encountered
in reaching the pedicle, and the almost impossibility of ren-
dering the operation aseptic, for tumors of this size are so
poorly nourished that they are almost always necrotic, and in
some parts sloughing.

The operation should never be undertaken until after several days of antiseptic preparation. This will be of the strictest character, and will consist in cleansing the vagina every six hours, first with *Peroxide of Hydrogen*, followed with *Bichloride of Mercury*, $\frac{1}{2000}$. These solutions should be carried up into the vagina between the tumor and the vaginal walls, by means of a glass female catheter, each time continuing the irrigation until the water returns clear. The final cleansing after the patient is on the operating table, will be with *Acidulated Alcohol*.

The tumor must be removed in sections, until the pedicle is reached, which is then treated by excision, and ligation, as already described. Several methods have been proposed for diminishing the size of the tumor, that which meets the indications best, is, beginning at the lowest point of the growth, successive fragments are seized, which are in turn clipped away with curved blunt pointed scissors. The bleeding may be profuse, but should not deter the operator from proceeding rapidly with the excision until the pedicle is reached. Ligating this will entirely control all hæmorrhage.

Occasionally a portion of the surface of the tumor that has not broken down, but has lost its covering of squamous epithelium, contracts adhesions with the vagina. These are never dense, and if they have not been separated during the preparatory treatment, are easily overcome as the fragmentary treatment of the tumor is accomplished.

The after treatment. The vagina should be lightly packed with iodoform gauze, which is removed in twenty-four hours. After a daily douche of Carbolic acid, or Creolin, a strip of gauze is inserted up to the cervix, for the purpose of maintaining drainage.

2. Sarcoma represents the simplest pathological construction. The tumor is made up of embryonal cells having various shapes, which may belong to any one, or to all of the connective tissue group. They are devoid of anything that resembles a connective tissue stroma, the cells being held together by the substances they produce at the expense of their own protoplasm.

Sarcomata contain no blood vessels, being without intercellular connective tissue. The channels, sometimes of large size, through

which the blood circulates, are no more than spaces between the cells, these spaces connecting directly with the blood vessels developed in the matrix tissue that is in immediate contact with the neoplasm. Neither do they contain lymphatics, or nerves, the lymph channels correspond in structure to those for the circulation of the blood, and are accidental clefts between the neoplastic cells.

The sarcomata are destitute of a capsule, or complete zone of protective inflammatory reaction. They are essentially infiltrating growths, invading their matrix by a continuous pushing forward of their outermost layer of cells, the rapidity of cell proliferation overpowering the barrier that nature would oppose to the advancement of the pathological process. This wall is no sooner formed than it is broken down, and the surrounding connective tissue becomes infiltrated with embryonic elements.

The arrangment of the cells that make up the mass of a sarcoma, is characterized by the most complete lawlessness. They are fitted to each other as the parts of a puzzle, their shape depending in a great measure upon their points of contact, the quantity of amorphous substance that represents them, and the direction and degree of pressure to which they are subjected.

The sarcoma cell has no membrane, and is commonly multinuclear, the nuclei being either spherical, or oval. Its physiological prototype is found in embryonic mesoblastic tissues previous to their under-going the changes that result in adult tissues; its pathological analogue in granulation tissue, in which all embryonic phases of connective tissue are met with.

In this formative or embryonic state of connective tissue there are two well marked cell types: *First*, the spherical, or round cell; and, *second*, developing from this, and approaching more nearly adult fibrous tissue, the fusiform, or spindle cell. The structure of sarcoma corresponds to these anatomical forms, and we have, therefore, still agreeable to the anatomical basis which we have adopted for the classification of neoplasms, a like division into round-celled, and spindle-celled neoplasms. Other varieties exist that partake of the character of different groups of connective tissue cells, but the chief

varieties are those in which round cells, or spindle cells predominate.

Round-celled sarcoma is the commonest variety encountered. There is no adequate reason for maintaining a division into large and small cells, for this records only a question of size; in other respects the cells are similar. Moreover, cells of various size are found in the same tumor, frequently only the most careful examination is capable of determining which predominates, and which in consequence should have precedence in classification.

Round-celled sarcoma resembles in structure the mesoblastic layer at a period when it consists of cells only, and before it has begun to form an inter-cellular substance. Cell differentiation has not taken place beyond the proliferation that caused the third blastodermic layer; cell function is arrested at that stage of the embryo. The cells are spherical, consisting of one or more nuclei in a mass of protoplasm, and are in every instance in contact with each other. There may be connective tissue septa dividing the growth into sections, but these walls are quite distinct from the embryonic tissues that form the bulk of the neoplasm.

The bloodvessels that exist in round celled sarcoma are contained in these septa, and are surrounded by fasciculated connective tissue. Blood spaces, though not very large, are numerous between the cells. They possess none of the characteristics of a circulating system. For this reason hæmorrhage from a round celled sarcoma is almost impossible to control before securing the large trunks that supply the growth.

Round celled sarcoma is soft, pulpy, grayish white, and sometimes almost translucent. Upon section these tumors yield an abundance of a transparent fluid, which may be milky from mixture of embryonic cells, or necrotic as portions of the neoplasm are reached and opened.

Spindle-celled sarcomata are also made up of embryonic connective tissue cells. The cells are large and small, and devoid of membrane. They are elongated, and tapering at the extremity, which is sometimes bifurcated. The nuclei are rod shaped,

corresponding in form to the cell body. The cells lie in direct contact with each other, there being an absence of inter-cellular substance, as in the round celled sarcomata, though the cells show faintly a tendency to arrange themselves in "*whorles*," resembling in this fibro-myoma.

Connective tissue septa do not commonly enter into the construction of spindle-celled sarcoma, hence the blood channels are for the most part inter-cellular spaces. The tumors possess no capsule, and infiltrate the surrounding connective tissue, growing irregularly from the periphery, by pushing forward the neoplastic cells.

Spindle-celled sarcoma represents a more advanced stage of tissue differentiation than round celled sarcoma; one that approaches more nearly the formation of fibrous tissue, a physiological step in the development of the embryo. Hence, though the cells are characteristically embryonic, they are further removed from the early functionless blastodermic period.

As a primary disease—it is occasionally secondary to pathological forci within the pelvis—both varieties of sarcoma appear in the form of a papillary tumor growing from one of the lips of the uterus, or as a diffuse growth originating in the musculature, involving the structures of the portio-vaginalis. Round or spindle cells may predominate in either of these neoplasms.

The Etiology of Sarcoma of the Uterine Cervix, follows closely that of fibro-myoma, with an added emphasis laid upon the facts of embryonic sequestration, of connective tissue "rests," of undifferentiated embryonic cells. These "left-over cells," which are capable of easy and frequent demonstration in every part of the uterine walls, having lost the functionating sense, and power of evolution, remain inert until stimulated to activity by errors of nutrition—mostly hyper-nutrition—when they begin to proliferate with such rapidity as to preclude the formation of a connective tissue barrier, against invasion into their matrix. Causes capable of inducing such nutritive changes, reside in the irregularly performed reproductive function; in constitutional conditions, or in a dyscrasia that disturbs the organic laboratory, furnishing pabulum better adapted

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for the nourishment of pathological, than physiological structures.

Neoplasms composed of cells that in every respect find their prototype in germinal embryonic elements, may also have their origin in the proliferation of the new formative cells that accompany the enlargement of the pregnant uterus. Until an organ has attained its growth, and has reached maturity, multitudes of new cells are formed. If these remain as proliferous tissue, they form a focus of embryonic growth, not to be distinguished from sarcoma of actual embryonic origin. The uterus does not attain maturity until the menopause, in as much as during menstrual life it is subject to oft repeated processes that lead to a development that is not permanent, and that do not accomplish the resting phase of the organ. Hence, we may regard menstruation, which is an attempt at preparing the uterus for conception, and pregnancy, as a very possible factor in the etiology of sarcoma of the uterus. Some new cells develop during that period that never acquire the functionating habit, but being stimulated to proliferation by local hypernutrition, become centers of connective tissue growth of an embryonic type.

The relation between the frequent, by some pathologists believed to be the constant, appearance of **certain vegetable parasites—psorosperms—and the cause of sarcoma,** is at present not capable of demonstration. This question has been referred to when speaking of the general etiology of neoplasms, but certain characteristics of sarcoma lend themselves to the possibility that more than a casual relation exists between the presence of these parasites, and the growth in which they are found.

Granulation tissue furnishes the pathological prototype for sarcoma, and the formation of this inflammatory tissue depends upon the presence of micro-organisms. Possibly, therefore, sarcomata of the uterus that originate in the new cells that belong to the parturient state, are associated with the presence of "*psorosperms.*"

Again, **if it can be shown that sarcoma is infectious,** and some recent experiments on dogs point in the affirmative direction, there is reason to believe that micro-organisms may contain

the potency of the neoplasm, for as far as present knowledge extends, micro-organisms are an essential of infectivity, the conveying of a disease from one individual to another depending upon the implantation in the host, of the specific organism. The method by which secondary growths are developed at a considerable distance from the original neoplasm, without the intervention of the lymphatics, but by means of the vascular system, favors the infectiousness of sarcoma.

The conditions of life favorable to the development of sarcoma in the uterine cervix, will relate to age, and marriage, and whether or not the patient has borne children.

The most common form in which sarcoma appears in the uterine cervix, the botryoidal, or grape-like sarcoma, shows a marked predilection for the years before puberty, and those following the menopause; that is to say, the period of reproductive activity seems to possess an immunity against the development of this neoplasm. In this respect there is a contrast between sarcoma and fibro-myoma, the latter being peculiarly liable to develop in connection with sexual vigor.

No other neoplasm is found in the uterus at the early age that sarcoma develops. From infancy—the earliest age recorded is one and a half years—to the establishment of menstruation, the formative period of the uterus, while it is growing, sarcoma of the cervix is not of very rare occurrence, and a cervical tumor developing within this period, is strongly suggestive of this neoplasm.

The other end of the cycle, that of the folding up of the menstrual organ, is also productive of sarcoma, but it is open to question, whether a sarcoma that develops at this period is not in many instances a sarcomatous degeneration of an already existing fibro-myoma that developed during reproductive life.

It seems a not unreasonable hypothesis, that infantile sarcoma, embracing the neoplasms that develop before maturity, are congenital, in the sense that the focus of cell proliferation is an embryonic sequestration; and that senile sarcoma, embracing the neoplasms that develop during the atrophy of the reproductive organs, originates in cells left over from the repeated growth-pulsations of the uterus.

Marriage has no other relation to the development of sarcoma than a demonstration of sterility, which has been observed to frequently accompany sarcoma. The question however of sterility, meaning broadly unfruitful marriage, is a complicated one, into which enters the absolute sterility of one or the other of the cohabiting parties, or the willful prevention of conception. It is however perfectly in agreement with the origin of sarcoma in new cells, that an abortive attempt at uterine development, as in incomplete marriage relations, or imperfect fertilization of the ova, may favor the development of embryonic connective tissue neoplasms in the uterus.

The clinical history and symptoms of sarcoma of the lower segment of the uterus, are entirely dominated by the criteria of malignancy, for these connective tissue neoplasms invariably destroy life if allowed to pursue their course unmolested.

For practical purposes but one form, the circumscribed— *Sarcoma botryoides*—calls for description, in as much as the diffuse form—*Deciduoma Malignum*—is very rare, and probably always secondary to parturient development within the uterine cavity.

Primary sarcoma of the uterine cervix is of uncommon occurrence, the disease usually depending upon the proliferation of embryonic cells implanted in a pedunculated sub-mucous fibroma, but that sarcoma as a primary neoplasm does occur in this location, especially during the pre-menstrual period, is attested by clinical experience.

Sarcoma of the uterine cervix shows a preference for the anterior lip, from which it develops as a papillary mass, that resembles a bunch of grapes. Each acini seems quite a distinct neoplasm, connected with the parent stem by means of its nutrient vessels, but this pedicle is also composed of embryonic tissue, and possesses no capsule or well defined protective zone to mark it from the connective tissue matrix. The tumor is covered with a single layer of squamous epithelium, and is a purple or violet color, not the gray color that characterizes cervical polypi.

Sarcoma of the uterine cervix grows with great rapidity, in a short time filling the vagina, and invading the uterus and pelvic connective tissue, following, as is the case with the sarcomata generally, the course of the large blood channels.

Metastatic growths develop in the ovaries, Fallopian tubes, and broad ligaments, the invasion of the latter, appearing as pelvic cellulitis, fixes the uterus within the pelvis by an infiltration of peri-uterine cellular tissue. Secondary deposits also appear with frequency in the lungs.

Botryoidal sarcoma gives rise to a more or less continuous oozing of blood, hence there is present a sanguineous, muco-purulent catarrh. Pain, either local or reflex, is rather unusual especially with the primary neoplasm, but is a very frequent accompaniment of the growth recurring after operative removal. Metastases are also more liable to develop with recurrence.

Sarcoma of the uterine cervix, usually returns *in loco*, within a short time of its removal, and with each recurrence it seems to gather in malignancy. Its clinical course is characterized by alarming rapidity of growth and reproduction. No other neoplasm possesses these features in like degree, and none are more certainly fatal, if the early operation is not complete, and radical.

Botryoidal sarcoma of the uterine cervix is liable to mucoid and cystic degeneration, especially the recurrent growth. By means of the first retrogressive change, the tumor is converted into a soft mass that resembles myxomatous disease of the chorion. **Cystic degeneration** is accomplished by a similar process of softening, which attacks numerous points, preferably on the surface of the neoplasm, transforming it into a collection of small cavities containing mucus.

When the sarcoma contains epithelial inclusions, or persistent glands of the cervical mucosa, cysts may form by the mucoid degeneration of the glandular epithelial cells. Such cavities are lined with columnar epithelium, and the tumors may appropriately be named *adeno-sarcoma*. The tumor may also become œdematous by interference with its lymphatic circulation.

Cervical sarcomata frequently contain nodules of hyaline cartilage. Unless we regard this as due to heteroplasia of sarcoma cells, a process which there is little warrant to believe takes place, they are probably of embryonic origin, and arise from the proliferation of germinal cells.

Owing to the low vitality of sarcomatous tumors, **these neoplasms are very liable to molecular necrosis.** The vagina is then occupied with a sloughing mass, that may become the source of septic intoxication. At this stage, when the protective covering of the sarcoma has been removed, and the essential neoplastic elements exposed, secondary growths appear in the vaginal wall that lies in contact with the broken down neoplasm. Analysis of this clinical feature speaks somewhat in favor of the infectious nature of sarcoma, for by no other process than the conveying of infectious products to the seat of the secondary development, can such occurrences be satisfactorily explained.

The Diagnosis of Sarcoma of the Uterine Cervix in Adolescence. The first symptom to attract attention is a bloody vaginal discharge. This occurring before the establishment of menstruation is almost diagnostic of botryoidal sarcoma of the cervix, and after menstruation has ceased, is suggestive of cervical epithelioma, or sarcomatous degeneration of a fibro-myoma.

Digital examination finds a pultaceous friable tumor attached to the anterior, or posterior lip of the cervix. If the grape-like conformation can be made out, the neoplasm is sarcoma, for no other tumor grows from the cervix, having such a figure. But this characteristic form may not be distinguishable without the aid of the speculum, or until the removal of the mass.

The neoplasm is friable, that is, easily broken down with the finger, or instrument, but to the finger it imparts a sensation quite peculiar to sarcoma. In penetrating the new growth the finger meets with little resistance, but the sensation is that of contact with a granulating wound, or with wet india rubber, very different from the spongy unorganized feel of a sloughing polypus.

Examination with the speculum. With the patient in the left lateral position, and the vagina opened with a duck-bill speculum, the best view is afforded of any growth originating from the uterine os, that occupies the vagina.

Botryoidal sarcoma appears as a violet or purple colored pedunculated grape-like mass. Its surface may be smooth, or is

more frequently studded with minute transparent cysts. This
is quite unlike a pedunculated fibroma, which is dark red, or,
when sloughing, gray in color, and though they may be multi-
ple, each tumor is sure to arise from the uterus, and extend
into the vagina as a long tongue-like mass.

**Botryoidal sarcoma of the cervix grows with a rapidity unknown in
other neoplasms having such an origin.** If recognized in the
early stages, the tumor appears as a small pedunculated
growth attached to the cervix. Even at this stage its violet
color will distinguish it from a mucous polypus, which is bright
red. But frequently the first symptom, a bloody vaginal ca-
tarrh, is disregarded, and the sarcoma is not recognized by the
surgeon until it has assumed much larger and graver propor-
tions. These follow very quickly upon the initial manifestation.
This rapidity of growth is of value in making a differential
diagnosis.

Sarcoma is essentially an infiltrating new growth, being possessed
of no protective envelope. The neoplastic process extends,
probably by means of contiguity, and we therefore find in sar-
coma of the uterine cervix an invasion of the pelvic con-
nective tissue, rather than lymphatic involvement, as in epi-
thelioma. Remote organs are however not uncommonly the
seat of secondary growths, which represent histologically
the primary neoplasm. Of these organs the lungs are the
most frequently attacked, and areas of pulmonary dullness—
they are usually multiple—with raspberry sputum, accom-
panying a tumor of the uterine cervix, suggest that the latter
is a sarcoma. The absence however of metastasis, or of sec-
ondary growths, especially during the early history of the initial
tumor, should have little weight in establishing against the
diagnosis of sarcoma, for as has been pointed out, these com-
plications are of rather late development, and are more liable
to follow local recurrence after an operation.

**Death is the result of the accumulation of the toxæmia that develops
from the rapid spreading, and speedy return of the neoplasm.** A few
months suffice for this return, and with each recurrence there
is a wider tissue involvement, and more extensive develop-
ment in remote organs. The brief interval between removal

and the local return of the neoplasm, is quite characteristic of sarcoma.

The Diagnosis of botryoidal sarcoma of the uterine cervix in the adult, is liable to be confused by the resemblance this disease bears to a necrotic pedunculated cervical fibroid. The clinical history will assist in differentiating between the two diseases. In other respects the diagnosis will not differ essentially from the lines already traced, save in the reproductive history, and in the age of the patient. The patient is commonly married, but sterile, or there is a history of abortions, or of mole pregnancy. She is near the close of menstruation, or has actually finished the function. A little bright red blood follows coitus, but this symptom also exists when there is only a simple cervical polypus. The most significant symptom, and one that should always lead to a rigid examination, is a pinkish watery vaginal discharge. Leucorrhœa of this nature also occurs in other conditions than cervical sarcoma, but it is always present in sarcoma, and usually without other symptoms, and inasmuch as it indicates a pathology of a serious nature, should receive prompt attention. While it is true that other conditions, cervical erosion, uterine polypus, and epithelioma are characterized by a discharge containing more or less blood, the pinkish, watery leucorrhœa, offensive, and inclined to be excoriating, stands especially for sarcoma, the discharges arising from other diseases generally having more consistency, and being either brighter red, or brown in color. Thus in the very beginning of the examination ground is furnished upon which to base a reasonable suspicion of the nature of the local pathology.

Pain is not a constant symptom of sarcoma of the uterine cervix. It is more liable to attend the later manifestations of the disease than its incipient stages, but may be absent during the entire course of the disease. When present it is of a dull aching character, involving the pelvic nerves, the sciatic, and the crural branches, but the absence of pain should not give a false sense of security, either as to the nature of the neoplasm, or its progress, for some of the most malignant and rapidly fatal cases of sarcomata of the cervix, pursue their course to lethal exhaustion, without suffering or pain.

The undoubted occasional sarcomatous termination of some fibroid tumors of the uterus, lends a diagnostic interest to those cases in which a pinkish discharge, and slight hæmorrhage after coitus occurring about the time of the menopause, in women who are known to be suffering with a cervical tumor. It also sounds a note of warning as to the early treatment that should be adopted in all such cases.

The findings of the microscope will assist in making a diagnosis. We thus learn the character and arrangement of the elements composing the neoplasm, and while I am not sure that the report should greatly influence our treatment, save in the extent and scope of the procedure, for all such growths may be removed, the knowledge thus gained will aid in giving a prognosis, and in determining the boundary of our amputation, and the extent of the tissues to be taken away.

The Treatment of sarcoma of the uterine cervix admits of but one proposition; early and complete removal of the uterus, adnexa, broad ligaments, and as much of the pelvic connective tissue as anatomical relations permit. Having established by clinical and microscopical data that the neoplasm is a sarcoma, no halfway measure should be adopted to insure its eradication. Palliative treatment, removal of the tumor only, or even of the cervix, are worse than useless, for if even a small focus of sarcomatous tissue remains, the operation seems to excite it to creased activity, the neoplasm early returning, and proving more rapidly fatal than if unmolested. Therefore without delay, the most radical hysterectomy should follow upon the establishment of the diagnosis of sarcoma.

If a case of sarcoma of the uterine cervix comes under treatment in the later stages, when there is reason to believe secondary growths have developed, no operation can remove the disease, and if such is attempted, not only will the results be a failure to cure, but the returning neoplasm will be attended with a degree of suffering, that probably would not have attended the primary tumor. The treatment then will be only palliative.

CHAPTER XI.

NEOPLASMS CONTINUED.

Group II.

EPITHELIAL NEOPLASMS OF THE UTERINE CERVIX.

Neoplasms of the lower segment of the uterus that have their origin in the outer and inner layers of the blastoderm, are built up of; (1) Squamous epithelium; or (2) Columnar epithelium, the situation of the new growth being determined in a great measure by its histogenesis.

1. **Squamous celled epithelioma** is composed of the epithelial cells covering that portion of the lower segment of the uterus that projects into the vagina—the portio-vaginalis—and that extends to the transitional line constituting the os externum. The boundary of the neoplasm is thus quite clearly set, as well as the clinical course it pursues, for while squamous epithelium is spread over the vagina and reflected on the os tincæ, as for as the columnar epithelium of the cervical canal, at the line of reflection where the smooth covering of the cervix gives place to the rather rougher and harder covering of the vagina, is placed a natural anatomical barrier to the extension of pathological processes.

We therefore find, that primary squamous celled epithelioma of the cervix is developed between the external os, and the vaginal fornix, and is during its course, for the most part confined to this region, the portio-vaginalis.

Squamous celled epithelioma of the uterine cervix may begin as one or more nodules—**nodular form**—in the mucous membrane of the portio, or as an uneven granular surface—**papillary form**—of the mucosa. In the former the excess of cell proliferation is in the direction of the deeper structures that become invaded with solid processes of epithelial cells of irregular shape, and without definite arrangement. The spaces

between these processes are occupied with connective tissue, that affords support for the nutrient vessels of the neoplasm.

So characteristic of squamous celled epithelioma are "cell nests," or epithelial pearls, that they deserve more than a passing mention. They are always present in this variety of epithelioma, and though small, and not numerous in squamous epithelioma of the cervix, are always capable of demonstration.

The "cell nest" consists of a centre of two or three large nucleated cells, surrounding which are arranged numeous flat cells that overlap each other as shingles are laid on a roof. This process of imbrication is more intensified as the outer parts of the growth are reached. The nest is usually spheroidal, but under certain mechanical conditions, several show a tendency to coalesce, when the outline becomes oval, or curvilinear, or even dumb-bell shaped.

In the central portions of the growth the epithelial cells are often difficult to make out, for it is here that the "*cell nests*," quite characteristic of squamous celled epithelioma, form by preference, and through pressure distort and crowd out the epithelial elements. The true histogenesis of the neoplastic down-growth, is apparent at the peripheral portions, where it is seen that the normal cellular arrangement is repeated. At this place "*prickle cells*" appear in considerable numbers.

At the same time that solid processes of squamous epithelium invade and take possession of the connective tissue of the cervical walls in the direction of the canal, the neoplastic cell formation comes to occupy more and more of the surface of the portio, extending to the vaginal fornix, or beyond, and up to the transitional zone that marks the external os. The neoplasm eventually encircles the cervix, but whether this is as an extension from the primary nodule of one lip, or from the coalescence of multiple foci of cell degeneration, is somewhat doubtful.

Before squamous epithelioma of the portio has invaded the deeper structures to any considerable extent, the superficial layers of the mucosa break down, and the neoplasm presents an ulcerated surface with hard ragged edges. This destruction of the epithelial

layer is caused principally by the invariable tendency of squamous epithelioma to central degeneration. The process is a true molecular necrosis, and quickly spreads over the surface of the growth.

At the same time the cell degeneration proceeds to the deeper parts, and the structures of the cervix are destroyed, leaving **crater-like ulcerated surfaces.** From these surfaces fungoid granulations develop which quickly assume a papillary form, and being but poorly nourished, are subject to early molecular death.

As squamous epithelioma invades the region of the os, **cervical glands are met with as a part of the neoplastic process.** The histology thus becomes confused, and with this intermingling of cell elements, that as separate pathological bodies possess a distinct history, the clinical history of the composite neoplasm may follow a correspondingly divergent course.

Such cases illustrate the blurring of any lines with which we would mark off and separate from each other, neoplastic processes. For neither alone upon structural data, or clinical history, is it possible to define sharply the various manifestations of a new-growth-producing-potency.

The Papillary form of squamous celled epithelioma of the portiovaginalis, does not differ from the nodular variety, save in its initial stages. Looking to its origin, possibly this variety of epithelioma would with more appropriateness be called "superficial," inasmuch as it starts in a proliferation of the outermost cells of the mucosa, involving the underneath structures secondarily. There is thus an early, almost a primary molecular necrosis and ulceration, without the circumscribed tumor that marks the starting point of the nodular form. Papillary squamous epithelioma causes extensive destruction of the mucosa, and is prone to spread to the vagina, even down to the introitus. The surface is thrown up in ridges and papillæ, that by extension and growth may fill the vagina.

The tendency of papillary squamous epithelioma of the lower segment of the uterus is to advance superficially—this characteristic receives an explanation in the etiology of the new growth—but it is certain later to force irregular processes of epithelial cells

down into the deeper connective tissue. These processes, as
in the nodular variety, run in every direction, so that upon
cross section they appear as islands, surrounded by a con-
nective tissue stroma. But this is in truth only a seeming ar-
rangement for the strings of epithelial cells never anastomose,
and each one can be traced from the central portion of the
neoplasm to its terminal point.

In this form of epithelioma, "prickle cells" are especially
numerous, in as much as they form a characteristic feature of
rapidly proliferating epithelial elements.

2. Columnar celled epithelioma of the uterine cervix, is the most
important neoplasm that develops in the lower segment of the
uterus, for not only is it of more common occurrence in this
region than squamous epithelioma, but the very large propor-
tion of epiblastic new growths found in the uterus, originate
in the columnar cells of the cervix, ascending from thence in
the direction of the corpus. It also possesses a malignancy
unequalled by that of any other uterine neoplasm.

Columnar celled epithelioma has its origin in the columnar
cells of the glands of the cervix. The immense number of
these simple glands that are normally developed in the cervi-
cal canal sufficiently accounts for the rapid dissemination of
this neoplasm, and the extent of its destructive powers.

**This form of epithelioma begins as a proliferation of the epithelial
cells lining the mucous glands of the cervix,** and their aberrent ex-
tensions. **The primary lesion is usually a small solitary nodule, situ-
ated frequently in the posterior lip near the external os,** though the
growth may arise in any part of the cervical canal. Occasion-
ally the growth begins as an enlargement of the entire uterine
lip, when the part attacked is hard, but early breaks down.
When the growth originates in the glands situated high
in the cervical canal in the region of the internal os, it is
still covered with normal cervical tissue of the portio, and may
remain concealed until the entire cervix is hollowed out with a
deep funnel-shaped ulcer. Such an excavation may progress
to a considerable extent before the external os is involved—
decending cervical epithelioma.

Columnar celled epithelioma of the cervix grows equally in all direc-

tions. It soon, from whatever point it may originate, involves the entire cervix, and spreads into the peri-cervical cellular tissue. **The growth consists of masses of irregular gland spaces, and tubules, lined or packed with epithelial cells.** In the latter condition no lumen is present, the neoplasm being a solid mass of epithelium. These tubules are without basement membrane, which in the true gland serves to limit and protect the secreting apparatus, and rest upon a stroma of connective tissue, that is sometimes embryonal, and into which free columnar cells are thrown in riotous confusion. The neoplastic construction presents a rude resemblance to glandular tissue, but the arrangement and juxtaposition of the several anatomical parts is without order, or regard to use, and the epithelial cells are functionless, having lost their habit of work—secretion, whereby the cells are cast off, and their place supplied with other cells—and taken on a purely vegetative or proliferating life.

The neoplastic cells have large nuclei, and multiply by indirect nuclear divisions. The cell multiplication, which is most active at the zone of the growth, serves to advance the alveolar processes beyond the limit of the normal gland, invading and destroying the muscular and connective tissue layers upon which the epithelial tissue rests.

The destruction of contiguous structures regardless of their genesis, a measure of malignancy, differing from the local effect of benign growths, which is to displace tissues, to push them aside without contamination, is especially characteristic of columnar epithelioma of the uterine cervix. No tissue or structure can withstand the malignance of the neoplastic epithelial cells. This potency is not active in the direction of instability of cell type, "metaplasia," for no such process is known in tissue building, nor is it possible to say just how the changes are accomplished, but as the neoplasm advances, the stroma is destroyed, until the part in which the new growth is situated is converted into a neoplasm, with nothing of the original structure remaining.

Columnar celled epithelioma of the cervix seems to find a natural barrier to upward extension, at the interal os, the narrow ring of transi-

tion tissue between the cervix and the body of the uterus. By preference the disease spreads to the external os, and portio-vaginalis, and when the parenchmya of the cervix becomes involved, as well as the mucosa covering its vaginal portion, the cone-shaped excavation is filled with a mushroom-like growth composed of rapidly proliferating epithelial cells.

While degeneration of the epithelial cells is taking place, for these are subject to early mucoid, fatty and necrotic changes, **the connective tissue stroma of the new growth is liable to myxomatous retrogression.** The epithelioma which in the beginning was characterized by solidity, and a sensation of hardness, **hence the name scirrhous,** is thereby softened and converted into a mass easily broken down.

The Etiology of epithelioma of the uterine cervix, embraces a voluminous literature, but continued observation gives support to the hypothesis, that inequalities in the nutrition of either germinal matter, or more mature cell bodies, forms the basis of departure from physiological tissue building, and that within wide limits **we may with propriety speak of a neoplastic potentiality** that is essential to the development of all new growths, meso-blastic, or epiblastic, benign, or malignant. This conception in no sense involves heredity, or even a constitutional dys-crasia, but simply recognizes a common genesis for all neo-plastic new formations.

But when we have said this, we have still to ascertain the causes that are active in bringing about different manifestations of this tendency to retrogressive changes. Such causes are primarily inherent in the tissues affected, and secondarily reside in the forces accidentally operative.

The primarily active factors are concerned with the construction of the cell and its life history. The secondarily active forces are those that have to do with the chemical physiology of the cell, and its enzymes.

Epithelial cells are essentially functionating bodies, in distinction from connective tissue cells which are structural. We, therefore, would expect to find developmental defects more frequently concerned with the epiblastic derivative, than with the meso-blastic, and by the same line of reasoning, to affect the organism with more profoundness.

In connection with the etiology of epithelial neoplasms of the uterine cervix, especially those originating in columnar epithelium, the frequency with which embryonal remnants and sequestrated cervical glands are found in the parenchyma of the lower segment of the uterus, may be regarded as developmental defects,—having their origin in imperfect segmentation,—that influence to a remarkable degree the genesis of epithelial neoplasms in this location. This ground has been covered when discussing the general etiology of neoplasms, but in its application to columnar epithelioma of the cervix, it remains to point with emphasis to the normal function of these cells, involving bursting of the cell wall, and subsequent casting off of the cell body, and the effect produced by purposeless proliferation of the same cells while embryonic, and before they have developed functionating qualities. A lawless multiplication thus results, and the neoplasm still retaining some of its constructive instincts, invades the surrounding stuctures.

Another primarily active factor in predisposing to the development of epithelial diseases of the uterine cervix, is found in the demonstrated fact, **that gland tissues contain more enzymes than other structures,** and in these secreting structures the majority of malignant neoplasms of the lower segment of the uterus have their genesis.

Traumatism in one form or another, in as much as it is the most constant secondary cause of the development of malignant diseases, may be looked upon as the sum of the secondarily active forces that are operative in locating epithelioma of the uterine cervix.

This hypothesis is entirely in conformity with **the "chemical theory" of the etiology of neoplasms.** According to the degree of irritation induced by traumatism, nature attempts repair by the formation of granulation tissue—difficult to distinguish from cells of embryonic type—and by the infiltration of embryonic round cells. These cells by their enzymes, to procure the glycogen necessary for their nourishment—**glycogen is found in all neoplasms, varying in degree with their malignancy,**—take from the blood an undue quantity of carbohydrate, and by this ex-

cess of food, or of enzyme, induce lawless cell development and growth, erratic cells genesis, and malignant degeneration.

We may proceed a step further in this hypothesis and its application, for the enzymes vary with the tissues involved, and being possessed of a selective action, assimilate from contiguous and remote tissue cells of the same group, to their malnutrition, and detriment, the carbohydrates that they require. Hence follow constitutional involvement, and the cachexia that marks the advanced stages of malignancy.

In this connection it is of interest to note that **diabetes is the only disease that appears to be incompatible with epithelioma,** a disease characterized by an excess of one of the groups of carbohydrates, glucose, in the blood. We may conclude that this incompatibility is because of the difficulty experienced by granulations, and embryonic round cells, found but scantily in diabetes as the reparative process is low, of drawing to themselves an excess of enzymes, hence there is not, as the result of injury, that exuberant cell proliferation and growth that mark the development of epithelioma.

Traumatism and physiological chemistry are complementary to each other, and strike at the very foundation of the metabolic laws that regulate and maintain a normal ratio between waste and repair, but it may be doubted whether the presence of aberrant, left-behind-cells is not always necessary to estabilish a focus of malignancy at the site of irritation.

It does not appear that the spasmodic activity of the reproductive organs, either that which attends menstruation, or the involution following parturition, has much if any influence upon the development of epithelial neoplasms. Such phases in the life history of the uterus are especially concerned with the pathogenesis of connective tissue neoplasms and their retrogressive changes, but it is probable that even a perfectly normal evolution and involution of the uterus, such as attends menstruation and gestation, may in the presence of a dyscrasia, set up the necessary local irritation for the hypernutrition of epithelial "cell rests" and so excite these elements to proliferate.

We are not in the same doubtful position regarding the

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effect of child bearing upon the development of cervical epi-
thelioma, for setting aside the question of age, which will ap-
pear later, **a large proportion of the cases of epithelioma of the uterine
cervix is found in women who have borne children**—virgins and nulli-
parous women being practically immune,—there being a direct
ratio between the frequency of epithelioma, and the number
of pregnancies. Statistics have shown, that five is the
average number of births in women who have subsequently
developed epithelioma of the cervix. In negresses, this va-
riety of epithelioma is almost unknown.

There is nothing connected with conception, pregnancy,
and the lying-in-period, *per se*, that predisposes to the develop-
ment of epithelioma, and therefore in view of the clinical his-
tory, we must find other causes, extrinsic to the performance
of these functions, that may attend them, but are not essential
to their exercise.

Traumatism, and the subsequent invasion of micro-organisms fre-
quently follow parturition, and the irritation and inflamma-
tion to which these give rise in the structures of the lower
segment of the uterus, are potent factors in disturbing the nu-
trition of the parts.

Laceration of the cervix has no other relation to the develop-
ment of neoplasms, than as a factor in inducing inflamma-
tion of the mucosal glands, and furnishing an excess of
pabulum to aberrent "cell rests" in the cervical parenchyma.
That the laceration is not especially concerned in the new
growth is evinced by the fact that the morbid processes only
rarely originate in the cicatricial tissue, but develop in the
angle of the cervical tear, as an extension from one of the lips.

The external os, functionally and anatomically offers a
natural barrier to the invasion of the uterus and pelvis. In-
jury of the mucosa, as in parturition, opens the door for in-
fection and the introduction of micro-organisms, both factors
in bringing about irregularities of cell nutrition, and the ex-
cessive assimulation of enzymes by the new cells.

**The position of gonorrhœa in the etiology of epithelioma of the lower
segment of the uterus,** can be no other than that of an irritant.
Next to the urethra, the cervix is most frequently the seat of

gonorrhœa, and the inflammation to which it gives rise may induce the necessary metabolic changes for the proliferation of sequestrated mucosal glands.

In studying the development of the uterus, we found that not infrequently the Wolffian duct remains as a vestigial organ in the parynchema of the infra-vaginal portion of the uterus. These embryonic epiblastic structures being vestigial, and functionless, require only the necessary irritant to excite them to lawless proliferation.

Age, not of the individual but of the organ affected, which may have reached its limit of active growth while the sum of the organism is still young, is one of the most certain factors in the etiology of epithelioma of the uterine cervix, for this is a disease that belongs to mature function, occurring most frequently between the fortieth and fiftieth years, when the uterus has rounded its cycle of functional activity, quite independently of other organs. The youngest recorded case of epithelioma of the cervix is in a girl of eight years, the oldest in a woman of seventy-five years, but this wide range may in the first instance be attributed to premature senility, and in the second instance to delayed functional folding up.

In classifying malignant diseases of the lower segment of the uterus, the term cancer is frequently made to include both connective tissue, and epithelial neoplasms. This grouping fixes an early date for the manifestation of a malignant diseases, without distinguishing between the two anatomical classes, but careful differentiation, refers epithelioma to the retrogressive period of life, when tissues are either holding their position, or suffering from irregular nutrition. The reason for this is not apparent save upon the hypothesis that disturbance of equilibrium between waste and repair, which characterizes the folding up of organic life, unsettles "tissue tension," and liberates the inherent power of proliferation that each cell normally possesses. The same process may induce cellular phagocytism, and the forces that have become active, are, in the presence of vigorous cell "scavenging," powerless to effect cell, or tissue retrogression. Hence in the presence of general health, the climaition to period reply.

It therefore does not seem consistent either with theory or fact, to award more than a determining position to age in the etiology of cervical epithelioma of the cervix. There is no reason to believe that mature years generate a certain potency, active in the direction of pathology, and destructive of life. In the presence of normal tissue construction the processes of decay would be powerless to induce neoplastic changes. We must presuppose a focus of pathological cell departure, restrained from development by the maturing organism, from which the restraint may be removed as the organism declines from maturity to death.

Conditions of life and environment, are associated with the development of epithelioma of the uterine cervix. A life of privation and hardship, under-nourishment, with insufficient recreation, poorly ventilated living and sleeping apartments, and all that goes to make up the existence of that class of women who merely live, predisposes, because of the low degree of vitality entailed, to retrogressive tissue changes, most active in the presence of developmental defects.

Contrariwise, a life of ease and comfort, nourishing food, and hygienic surroundings, establish a barrier of resistance that assists to overcome latent pathological foci.

The middle social state is flanked on the other side by a life of idleness, enervating and purposeless, not of necessity vicious or dissipated, in which the whole organism, but more especially the organs that belong to the reproductive system, grow old before their natural time, thus establishing a premature process of decay, with its attending low vitality and diminished resistance to local irritation.

Race and Stages of civilization are etiological factors in the development of cervical epithelioma. Unlike connective tissue neoplasms, epitheliomata are more common among the white races than the African, or Asiatic races. They are practically unknown among savages, or those who lead a perfectly natural life, from which we may infer that this neoplastic growth, in some manner, that we do not quite understand, is associated with the peoples distinguished for intellectual and moral development; in other words, epiblastic new growths of the

uterus show an especial predilection for the highest forms of civilization, not however always attacking representatives of the highest development of the race.

There is little to show that heredity occupies more than a casual relation to the development of epithelioma of the uterine cervix. To establish such a relation something more is necessary than to prove that different members of the same family are subjects of the same diseases; we must at the same time eliminate other causative factors, and prove that no other source than heredity is operative. This cannot be done in epithelioma of the uterine cervix, for in just those cases of suspected transmission, other etiological factors, histogenesis, child-bearing, traumatism, age, etc., etc., are present, and obscure the relations that heredity may hold to the pathogenesis of the cervical epithelioma. No case of epithelioma of the uterine cervix has been traced to heredity, to the exclusion of all other factors, and while heredity may be a factor in the etiology of cervical epithelioma, the subtlety of the problem involved in its study, as well as the uncertainty of the laws of transmission, do not justify us in attaching too much importance to heredity in those cases that seem to show such an origin, for in the presence of more certain and more easily recognized causes, the question of inheritance may well be awarded a secondary position.

Within the past few years the idea that a specific parasite represents the essential elements in the reproduction of epithelioma, has taken hold of the scientific mind, and in some quarters gained numerous adherents. The majority of pathologists, however, are not convinced that the **parasite, or protozoon found at times in epithelial neoplasms** stands in this actual causative relation to their development.

Certain bodies have been found in malignant tumors, especially in their rapidly growing parts, and these have been variously taken for parasites, or "*fuschin bodies*" from their affinity to that particular stain; most observers, however, regard these as cell "inclusions," or degenerated cell protoplasm, and refuse to accept them as a cause of epithelioma, in as much as they are not constantly present in epilastic neoplasms.

Inoculation with these bodies has thus far failed to cause a reproduction of the primary lesion, and even when found in considerable numbers in the initial growth, do not invariably exist in the secondary, or metastatic development. Such facts speak against the essential character of the "*psorosperms*" sometimes found in epithelioma, for if we are to regard epithelioma as a parasitic disease, these bodies, assuming that they are protozoa, and the cause of the pathology, should always be present in the neoplasm, and form a constant feature of its extensions.

Moreover, the method by which neoplasms grow and involve contiguous or remote tissues, is not such as we learn to associate with the action of micro-organism, for while clinically some resemblance may be traced between neoplasms and parasitic diseases, here the analogy ceases, for neoplasms increase by proliferation of their cell elements, and parasites expend their activity upon already existent tissues. There is no instance of parasites building up a structure, they rather destroy already existing parts. The opposite is true of neoplasms, and especially the malignant forms, for they constantly tend to reproduce in a crude fashion, but in such manner as may be recognized, organs and parts of the body that they represent histologically.

Investigation will continue in the direction of every clew that can possibly lead to the ascertaining of the cause, or causes of malignant neoplasms, and pathologists will not rest until the meaning of these microscopic bodies is known, but until that time, we do not seem to be justified in considering more than an accidental relation to exist between the presence of these cell bodies, and the development of cervical epithelioma. They may be a cause, but they are not necessarily connected with the histogenesis of the new growths. Their presence, possibly the resulting enzymes, may modify or determine the course of a given neoplasm, but a more intimate relation than this thus far has not been demonstrated.

The parasitic orgin of epithelioma stands in close relation to its possible infectious character. It is a fact that certain situations, "cancer houses," "cancer localities," exist where the disease

seems to be endemic, and persons who live in these places become affected with some form of malignant new growth. So many conditions however of hygiene, and of living, are associated with such locations, that are known to contribute to the number of predisposing causes of epithelioma, that we cannot clearly distinguish environment from the possible presence of a disease-bearing micro-organism.

If contagion and infection are properties of epithelioma of the uterine cervix, they either cannot be constantly operative, or they require uncommon conditions for their activity, for among the multitude of cases of epithelioma of the cervix, there is not one well authenticated instance in which the disease has developed in the penis, through coitus. Epithelioma of the penis has been observed in men who have maintained sexual relations with women suffering with the same disease of the uterine cervix, but so has this neoplasm been found in men without the possibility of such an origin, and men have continued to cohabit with women suffering with this disease, and shown no sign of its development in their genital organs.

In the present state of our knowledge we cannot say that contagion or infection are essential properties of epithelioma of the cervix. It is possible that future investigation will determine a more exact relation between the neoplastic cells and the conditions essential for their proliferation, that may in a measure explain the seeming instances of contagion.

The Clinical History and Symptoms of epithelioma of the uterine cervix, form one of the darkest, and it must be confessed, one of the most hopeless pictures in gynæcic pathology. This gloomy outlook is justified, not alone by the traditional course of these growths, with which medicine is familiar, but by the undoubted fact that all malignant diseases of the uterus are increasing; that they are becoming prevalent among a wider range of subjects, and that their malignant potency does not manifest a corresponding attenuation. Hence, epithelioma of the uterine cervix, as one of the most malignant diseases of the uterus, as well as the most frequent of all malignant diseases, is to be reckoned with as an important proposition in all matters pertaining to the life of women.

We must remove from the conception of epithelioma any discoverable systemic condition that precedes, or accompanies the development of the local lesion.   None such has been observed.   There are no signs by which we can say that such and such an one may become the subject of cervical epithelioma, and since we cannot rely upon heredity in the etiology of the disease, we are not able to say that the off-spring of parents suffering from epithelioma of the cervix, or of any other organ, are especially liable to its development.

Upon the general hypothesis that developmental defects are rarely confined to a single part of the system, but affect more or less the whole, we may possibly assume that those women who manifest imperfect development in some part of the genito-urinary system, bicornate uterus, imperforate os, and the like, are especially liable to embryonal cell inclusions, and glandular segmentations, but this is purely speculative.

The women who become subjects of epithelioma of the uterine cervix, are usually specimens of healthy womanhood. If in the humble walks of life they are toilers, showing great endurance and power of work until they reach the period of physical decay, when they rapidly fail, and the cause is found to be epithelioma of the cervix.   Such women are usually multipara, who have borne their children naturally, and with little inconvenience.

Among those who lead a life of ease and luxury, the subjects of epithelioma are usually rather marked for their vigor and health.   They too have reared families, with less injurious effects than might have been expected from their enervating surroundings.   Their functions are normally performed, and their assimilation is apparently good.

It has been observed that early menstruation is very common among the future subjects of cervical epithelioma, but this condition obtains frequently when not followed by a local pathology, and the relation is therefore so remote as to rob premature pubescence of diagnostic value.

The earliest symptoms in the clinical history of epithelioma of the uterine cervix, and one upon which too much stress cannot be laid, is an irregular sanguineous pudendal discharge.   It is not

a hæmorrhage—such a flow would indicate fibro-myoma—and is apt to be more brownish than bright in color, a pinkish watery discharge being suggestive of sarcoma. Such a discharge may occur between the menstrual periods, after any unusual exertion, straining at stool, and the like, or may follow coitus, but it is of especial import when post-climacteric, and should always lead to a most careful investigation as to its source.

The popular impression concerning the menopause is rather opposed to attaching the importance to this symptom that it deserves, in view of its possible meaning, for frequently this slight bloody discharge is for a considerable length of time the only indication of the presence of a rapidly growing neoplasm, that has assumed proportions, and increased beyond the possibility of eradication before other symptoms appear. Gradually the discharge becomes offensive as the neoplasm passes into the stage of molecular necrosis, and is subject to the invasion of saprogenetic organisms, for which the relaxed vagina of multipara is especially favorable.

Pain is a variable, but late symptom of epithelioma of the uterine cervix, and some cases may pass to a fatal termination without more than the physical discomfort that belongs to the destruction of organs, and interference with their function.

The variation in the character, and the degree of pain depends upon the location of the neoplastic process, and to a certain extent upon its nature. As long as the neoplasm remains confined to the vaginal portion of the cervix the pain is very slight, and located in the hollow of the sacrum. It is a dull ache, and annoying more for its persistence, than for its severity.

As the destructive process advances, involving the supravaginal portion of the lower segment of the uterus, the parametrium is invaded, and in like degree there is an accession of pain, due to pressure on nerve trunks. The pain spreads to the thighs, and down the legs, but rarely extends below the knee. In some advanced cases where there is an extensive invasion of the pelvis, the anterior crural nerve is affected, probably through the sacral ganglia, and severe crural neuralgia becomes a most distressing feature of the late stages of

the disease. Only exceptionally, however, are the pains of cervical epithelioma other than dull and distressing in character, resembling somewhat the pains of congestive dysmenorrhœa, but unlike the pains having this origin, the recumbent position affords no relief; they are constant and without exacerbation, becoming even more severe at night than during the day.

Epithelioma of the cervix is rarely attended with any local sensitiveness, only after the vagina becomes involved, or the peritoneum invaded, does pain attend manipulation of the pelvic organs. The abdomen is then sensitive upon pressure, because of local peritonitis, and a vaginal examination is rendered painful.

The Involvement of Lymphatic Glands. The glands most frequently affected in cervical epithelioma, are the two glands on either side of the cervix—when they exist,—and the iliac glands. The former are not always found, but when present may be felt by pressing the finger well up in the lateral vaginal fornix. There is also occasionally a small gland behind the cervix, above the vaginal cul-de-sac, that may become infected. Both of these glands are, however, so near the focus of disease, that they are easily obscured in the growth itself.

The Iliac glands are situated at the bifurcation of the common iliac artery, in close proximity to the external iliac vein, on a level with the sacro-iliac-synchrondosis. Save under exceptionally favorable conditions, they are difficult to palpate through the abdomen, but are more accessible by means of the rectum. Their enlargement from metastatic deposit may be inferred, even when they cannot be palpated, in the presence of œdema of the lower limbs, which is in a large measure due to the pressure they make on the vascular channels, and consequent interference with the return flow of blood.

The Inguinal glands, being less intimately connected with the lymph system of the lower segment of the uterus, are less frequently the seat of neoplastic cell deposits, than the iliac glands. Their involvement indicates a very general dissemination of the neoplasm, and a hopeless stage of the disease.

More frequently the pathology spreads by an invasion of the surround-

ing tissues. The manner in which this is accomplished has not been ascertained. The theory of contamination, that is, contact between the healthy cells and the neoplastic elements, will not account for the progression of the neoplasm, **for there is no proof that a healthy epithelial cell ever becomes a pathological cell through contact with diseased epithelial elements.** A certain action may be brought about by the enzymes of the epithelioma, by the absorption of which the cells forming the barrier around the new growth are altered and made to resemble those of the neoplasm. But this metabolic process does not result in an actual reproduction of the characteristic histogenesis. As far as we know, the invasion of contiguous structures is accomplished by proliferation of the diseased cells at the periphery of the growth, from which they advance in certain well marked directions. The matrix cells which this overgrowth replaces, are made to disappear by a process of digestion, by means of which the cells are broken up, and go to nourish the pathological bodies. Thus, infiltration by atypical epithelial cells proceeds as rapidly as the surrounding cellular tissue furnishes food for their nourishment.

The growth of epithelioma of the cervix by infiltration into the surrounding tissues, is an early symptom, of columnar epithelioma. This form of neoplasm involves the walls of the cervix profoundly, and therefore readily spreads in the direction of the contiguous connective tissue.

The para-metric structures first involved, are in the majority of cases, **the sacro-uterine folds, or ligaments.** From the posterior lip of the uterus the neoplastic process pushes itself along the line of these muscular bands, towards the sacrum, and can be felt through the cul-de-sac as an irregular curved line, usually on one side only. The outline is very clearly defined by means of a rectal exploration. The involvement of the utero-sacral ligaments is a true infiltration of epithelial cells into the muscular structure, and while the lymph channels in this situation may share in the advance of the disease, they are not the chief means by which dissemination is accomplished.

The connective tissue of the broad ligament is invaded next in frequency, and this proliferation of the epithelial cells, which

is in the form of pyramids, excites the matrix cells to a like multiplication, thus forming outside of the epithelial neoplasm a zone of rapily formed, immature connective tissue cells. This vicious contamination of the connective tissue matrix is a common feature of epithelioma, but.it seems to be more clearly marked when the broad ligaments are invaded from the lower segment of the uterus.

The infiltrations of epithelioma of the uterine cervix, are by preference confined to the pelvis, rarely involving the body of the uterus, or breaking through the peritoneum; and peri-uterine tissue may become extensively replaced by the neoplastic growth, before other structures are involved.

While epithelioma of the lower segment of the uterus is more frequent in the posterior than the anteror lip, or possibly the posterior lip is more commonly the seat of the primary lesion, where the new growth occasionally develops as a nodule buried in the walls of the cervical canal, **the bladder wall is earlier infiltrated than the rectum,** even though development of the neoplasm in the anterior lip is a later extension of the growth. The depth of the posterior cul-de-sac, which interposes the reflected vaginal mucosa between the cervix and the rectum, may account for this. The anterior cul-de-sac is more shallow, and the cervix is separated from the bladder by its musculature, and connective tissue only. Both bladder and rectal infiltration mark the later stages of the disease, and are usually associated with general and widespread extension, and tissue replacement.

The body of the uterus is rarely invaded from cervical epithelioma. The most extensive infiltration of broad ligament, bladder, and rectum may take place before the neoplastic process passes beyond the internal os, and even when the corpus is involved the peritoneum serves as an anatomical barrier to the further spread of the disease; the pelvic cellular tissue surrounding the lower segment of the uterus, and that which occupies the broad ligament being by preference invaded before the serous covering of the uterus is destroyed.

Epithelioma of the cervix frequently invades the ureters, attacking them as they pass through the broad ligaments. There is an

actual infiltration of the new growth, by means of which the urinary tubes become more or less occluded, with corresponding degrees of urinary retention. Hence follow, ureteritis, and mechanical nephritis.

There is no evidence that epithelioma develops in the kidneys as the result of an ascending ureteritis. Atrophy of the papillæ and pyramids, and eventually of all the structures of the kidney, may follow hydrostatic compression, and bacterial infection of the confined urine may cause pyo-nephritis, but the primary pathology is not reproduced in the renal organ, even though the ureters are extensively infiltrated.

The wall of the ureter may break down as the result of the destructive neoplastic process, causing a urinary fistula. If this communicates with the abdominal cavity fatal peritonitis must follow, but usually at the period of the disease when such an ulceration would occur, adhesive inflammation has closed the general peritoneal sac, and the fistulous track opens directly into the neoplastic mass that surrounds the uterus, or has replaced its structures. The urine is then discharged through the cavity of the uterus.

Probably some of the cases of urinary fistula connected with epithelioma of the cervix, that in routine diagnosis are thought to depend upon the destruction of the utero-vesical septum, are in reality due to a ureteral fistula, the bladder remaining intact. Such cases should show a lateral extension of the new growth, rather than an anterior extension, and would be attended with well marked symptoms of ureteritis

The same inflammation of the ureters, and neoplastic infiltration, with involvement of the kidneys more frequently leading to **pyelo-nephritis,** follows invasion of the bladder. This occurs late in the disease, for the bladder mucosa resists for a long time infiltration of the epithelial growth. Hence the entire vesico-uterine septum may be replaced by the neoplasm before the bladder is opened. The ascending ureteritis that arises from epithelioma of the bladder that has spread from the uterine cervix, is probably quite as frequently dependent upon septic infection—the micro-organisms gaining admission through the fistulous opening,—as it is upon an extension of

the neoplastic growth, for the nephritis accompanying cervical epithelioma is almost certainly septic.

Reproduction of the primary pathology in remote parts—metastasis,— is characteristic of malignant growths. In epithelioma it is accomplished through both the blood and the lymph channels. The part played by the lymphatics has been referred to. Epithelioma extended by this means probably remains circumscribed by the group of glands invaded, and does not replace the organ in which the lymphatics are situated. On the other hand, when the blood channels are the avenues through which the neoplasm spreads to remote parts, the organ thus attacked suffers, and is eventually entirely destroyed.

The process of metastasis of epithelioma by means of the blood channels, is one with that of the formation of emboli. As long as the growth remains intact, that is, has not broken down, the conditions are unfavorable for metastasis by means of the blood vessels, but with disintegration, the germinal cells are carried into the circulation, and washed on until they become arrested at a bifurcation of the channel, or by its reduced calibre. Possessing all the proliferating properties of the cells of the primary neoplasm, they multiply in like manner at their place of lodgment, and develop foci of disease, in every respect similar to the parent growth. In as much as the neoplastic cells cannot enter the blood circulation until breaking up of the primary growth takes place, neoplastic emboli—metastatic growths,—belong to the late stages of epithelioma of the uterine cervix.

The liver and lungs are the remote organs in which metastases occur most frequently in epithelioma of the lower segment of the uterus. The germinal cells reach the liver as emboli, either through the portal vein, or the general circulation. They lodge in the smaller branches of the inter-lobular veins, or in the capillaries, and there develop by multiplication, into nodules that first compress, and later destroy the liver structure. These nodules are generally sharply defined by a capsule formation, and separated off into small nests by the stroma derived from the inter-lobular connective tissue of the liver. The metastatic growth either thrusts the liver aside

—the softer neoplasms,—or infiltrates the liver tissue, replacing it with the epithelial new formation—the firmer growths. The process of infiltration of the liver is not altogether one of disintegration and absorption of the matrix cells, but with this is associated strangulation of small masses of liver cells by the encircling development of the new growth. Hence atrophy, and the ultimate disappearance of the biliary organ.

The lungs are not as frequently the seat of metastasis in epithelioma of the uterine cervix, as the liver, but the immediate consequences are more disastrous, in as much as normal metabolism requires integrity of a considerable proportion of lung tissue, but is less dependent upon the functional activity of the entire liver.

Metastatic epithelioma of the lungs is commonly unilateral, with a predilection for the right side. Both the lymph and blood channels assist in conveying the pathological cells from the primary neoplasm to the lungs, but the most frequent origin of secondary pulmonary growths, are emboli that become arrested in the smaller twigs of the pulmonary artery. These cell masses increase with great rapidity, and soon destroy the arterial wall, replacing lung tissue with the new growth. From these metastatic foci the superficial and deep lymphatic vessels are invaded, as well as those surrounding the bronchi. The disease thus spreads beyond the lung, and involves the mediastinal lymphatics.

With infiltration of the para-metric tissues, which may be quite extensive before molecular necrosis takes place, the digestive organs suffer. There is commonly anorexia, with vomiting at a comparatively early period, before mechanical pressure or sepsis can be assigned as causes.

Irregular diarrhœa, alternating with constipation, is a rather constant symptom of the general gastro-intestinal disturbance. The constipation is caused by pressure of the parametric exudate upon the rectum, and effects the lower bowel only, there being an inability to empty the rectum of its contents. The diarrhœa is probably also caused by pressure of the pelvic extension of the growth, which induces congestion and

inflammation of the intestinal lining, alternation between the two states being due to the irregularly active obstruction, rather than to the condition of the fœcal mass.

With the pelvic infiltration of cervical epithelioma, the uterus becomes fixed, it seeming to be a part of the dense mass that occupies the pelvis. The low degree of peritonitis present, by inducing an exudate into the peri-uterine cellular tissues, assists in the immobility of the uterus.

Epithelioma of the lower segment of the uterus, and the same may be said of all heterologous new formations, contains **the elements of self-destruction.** For while we speak of such growths as tissues, the term is not accurately descriptive of their building up. No vascular system exists by which the masses of cells can be sufficiently nourished, and the groups of rapidly formed embryonic elements at the surface of the growth, are mechanically crowded away from the blood channels, and die from lack of nourishment. Hence molecular necrosis is an essential feature of cervical epithelioma. There is no attempt at repair on the part of the neoplastic cells; as they are cast off similar ones form to take their place; the capacity for rapid proliferation increasing with the continuation of the process.

True degeneration, in the sense of breaking up of the proteid material of the epithelial cell body, is extremely rare, the only form that has been observed is that of colloid degeneration, and this is confined exclusively to neoplasms composed of columnar epithelial cells; it is unknown in squamous epithelium.

The period at which the molecular necrosis begins, or its rate of progress, do not seem to follow any special laws. Both processes depend upon the rapidity of the growth of the neoplasm, and into this problem enters all that goes to make up the constitution of the individual, and the local as well as the general causes that encourage, or discourage, over-nourishment of the neoplasm.

A fetid muco-purulent discharge, containing necrotic tissue, is always present at this stage of the disease. It is more or less mixed with blood, for the vascular channels containing no walls are without power to contract after being opened by the destructive

process.   Later, when the bladder and rectum are opened, fæces and urine are mixed with the discharge from the neoplasm.

With the imperfect nourishment of the neoplasm, induced by its rapid growth, and the consequent breaking down of the mass, there is always a mild degree of sepsis present, the temperature rising to 100° or more in the evening, and dropping to normal in the morning.   This sepsis, or sapræmia, is a part of the general depressed vitality and malnutrition that mark the late stages of all malignant diseases.   It must not, however, be confused with cachexia, or with the causes that lead to that toxæmic state; these are quite distinct, and have to do especially with the histogenesis of the new growth.

A general toxæmia offers the most satisfactory explanation of this group of phenomena.   The loss of flesh, and peculiar unwholesome yellow color of the skin; the impoverishment of the blood, as shown by the white lips, waxy ears, and puffiness about the eyes; the weakness of the heart, the drowsiness, and impairment of vision that mark the closing stages of epithelioma of the cervix, all indicate the presence of some overpowering poison that the system cannot resist.   This poison does not arise from the septic discharge at the seat of the ulcerative process, but depends upon the enzymes of the neoplastic cells, and their effect upon nutrition.   The matter of cachexia therefore belongs to the realm of pathology.   The neoplastic cells select from the blood necessary food, and through their enzymes give into the blood soluble chemical ferments, that profoundly interfere with general metabolism.

Cachexia is a late effect of epithelioma of the lower segment of the uterus, and is quite independent, as to time and cause, of the molecular necrosis that shows itself in the destruction of the neoplastic mass.   That is to say, the system may show the effects of faulty metabolism as the result of the peculiar selective action of the neoplastic cells, before it is exposed to the absorption of ptomains, and without the aid of septic intoxication.   In some instances lowered vitality is the first condition to arouse a suspicion of the local cause, the breaking down of the primary growth, and the development of secondary growths, following systemic involvement.

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Epithelioma of the uterine cervix unless arrested invariably terminates fatally. The average duration of the disease, whether of the squamous or the columnar variety, is about eighteen months, though this estimate is necessarily based upon faulty data, the majority of cases having existed a considerable length of time before they are recognized. The personal equation, represented by the power of resistance against the enzymes of the pathological cells, enters largely into this question. Without systemic involvement, the local pathology, however extensive, or anatomically disfiguring, would be ineffectual to cause vicious metabolism.

The extreme periods that have been observed for the **duration of epithelioma** of the uterine cervix, are four months at one end of the scale, and five years at the other. Those that develop in early womanhood are more liable to run a rapid course than those that appear later in life, the vigor of youth seeming to supply the necessary pabulum for the nourishment of the neoplastic cells.

No particular value is attached to the exact duration of life in any given case of epithelioma of the cervix. As clinicians it is sufficient for us to know that the disease is certainly fatal if unmolested, and as surgeons it is only necessary to assure ourselves of the diagnosis, and apply our treatment to the removal of the local pathology.

While, therefore, we may draw certain general conclusions as to the duration of cervical epithelioma, our most trustworthy data will be obtained from a determination of the fixedness of the uterus, and the morphological changes that have taken place in the neoplasm at the time it comes under observation.

The clinical history of epithelioma of the uterine cervix is an index to **the causes that lead to death.** In the large majority of cases the patient dies from exhaustion, from a failure of the organs essential to life to perform their functions. Heart failure, œdema of the lungs, pneumonia supervening upon pulmonary metastasis, but above all uræmia, induced by interference with the function of the kidneys, contribute to the definite termination. Fatal hæmorrhage is extremely rare,

for unless some large pelvic artery or vein is suddenly destroyed, as the disease advances it occludes the vascular spaces of the neoplasm to such an extent as to leave only a minute opening through which nothing more than oozing takes place.

Peritonitis, as a result of the primary neoplasm, is uncommon in epithelioma of the cervix. The process rarely spreads up into the uterine fundus, and when it does the peritoneum serves as a natural barrier to the pelvic extension of the disease, but as a contributing cause to the termination of cases that have been operated upon, septic peritonitis, from the rupture of a pus focus into the peritoneal cavity, is very common. The peritonitis thus induced is not active, and leads to the formation of adhesions, that favor local, rather than general, peritonitis.

The Diagnosis of epithelioma of the lower segment of the uterus. The certainty that epithelial neoplasms are primarily local errors in cell morphology, and in no sense an extension of a general dyscrasia, and that only by dissemination from the initial lesion do they affect the system, and involve other parts, emphasizes the necessity and value of an early diagnosis. In the primary stage of the disease it can be cured; in the secondary stage, that of general dissemination, it cannot be eradicated.

So insidiously is **the epithelial neoplasm frequently grafted upon the simple pathology of erosion, and glandular hyperplasia,** and so closely do the initial lesions of both conditions resemble each other, that no case of erosion of the uterine cervix, unless of the most superficial character, and yielding readily to treatment, should be refused a rigid and determining examination; and no case of cervical erosion should be allowed to continue without treatment.

There is nothing in the early clinical history, or in the early appearance of epithelioma of the lower segment of the uterus, that serves to indicate the nature of the pathology. A small growth in the posterior cervical wall of a uterus that is approaching senility; an irritable mucosa of a multiparous uterus, or of one that has suffered trauma, excite suspicion, but the absence of these, or of any of the recognized etiological factors that precede the development of epithelioma of the cervix, should not permit us to indulge in a false sense of security in any case of inflamma-

tion of the lower segment of the uterus. Neither age, social condition, nor family history, should weigh against the findings of the microscope—in this early stage there is no clinical history. They may, or they may not, confirm the pathologist's report, and in the beginning of the local error in cell life, it is safer to rest upon the minute anatomy for our diagnosis.

As we have elsewhere pointed out, **epithelioma is a disease of old age,** not necessarily of the entire system, but of the particular organ in which the neoplasm develops. The actual years therefore of the patient, do not carry much weight in arriving at a diagnosis, and our means of ascertaining the age of the part attacked are limited. We may, however, conclude that a uterus that has repeatedly been called upon to perform the parturient function, is nearer senility than a nulliparous uterus, though the actual number of years the person has lived may not be many. It is in multipara that epithelioma is most liable to develop, and this factor is important in making up the diagnosis.

In view of the **increasing prevalence of epithelioma of the uterus**— 95 per cent. of all cases have their origin in the lower segment,—any woman suffering from cervical leucorrhœa, all women who have borne children, and women at the climacteric, should receive a careful examination of the uterus, whether or not symptoms point to disturbed function. We may thus happily anticipate the symptoms that first call attention to a local pathology that frequently has existed for a length of time before making itself manifest.

Upon introducing the finger into the vagina, there is frequently found a slight thickening of the vaginal mucosa as it nears the fornix, and at a point corresponding to that part of the portio, or cervix affected. This condition may involve the mucous membrane of the infra-vaginal portion of the cervix, and when present is a valuable sign of epithelioma. The sensation communicated to the finger, is that of **fixedness of the mucous membrane upon the underlying structures.** In health the membrane is freely movable and elastic, but when epithelioma has developed in the cervix, these characteristics are lost, the feel of the cervix may well be compared to that of passing

the finger over wet india rubber. The condition is probably caused by protective exudation, not necessarily by an infiltration of the essential cell elements into the connective tissue.

The feeling of the os, and its behavior under manipulation, afford valuable diagnostic data. **The neoplastic tissue is soft and velvety,** and even though not raised above the level of its connective tissue matrix, conveys the impression when pressed upon, of moving in a denser walled excavation.

The neoplastic structure is friable, and, with the finger or a dull curette, which may be used without a speculum, is easily broken up into small pieces. Upon this feature of **friability, a characteristic possessed only by malignant new formations,** and sometimes in a lesser degree by broken down tubercles, and the absence of elasticity of the mucous membrane, a reasonably accurate diagnosis of epithelioma can be ventured without occular demonstration.

The other conditions that may be confused with epithelioma of the cervix are papillary and polypoid erosions, but neither of these diseases is accompanied with vaginal thickening, nor are they characterized by the friability that belongs to the epithelial neoplasm. Both papillary and polypoid erosions of the cervix break down under pressure, and therefore possess a measure of friability, but the essential difference between the friability of these conditions and that of epithelioma, is that the structure scraped away is superficial and raised above the surface of the cervix, while that which is removed from the epithelioma is on a level with the cervix, and leaves a temporary excavation in the neoplastic mass.

Even at this early stage of cervical epithelioma the uterus is liable to be fixed posteriorly, infiltration having progressed thus far. Bimanual examination discovers a slight thickening of the utero-sacral ligaments, and a corresponding immobility of the uterus. This peculiar fixation of the uterus will never be found in other than malignant growths, and is conclusive proof that the process has passed beyond the local stage.

In appearance, the early stages of epithelioma of the cervix, will need to be diagnosed from severe cases of cervical catarrh, with ectropion, and the several forms of hyperplasia of the cervical glands. Epithe-

lioma of the cervix in its early stages is rather pale in color, and yellowish, with white spots scattered over its surface. It resembles granulation tissue that has been subjected to the blanching process of fomentations. It is clearly defined from the surrounding mucosa, from which it is marked off by a zone of darker color. Erosion of the os is frequently reddish purple, and passes more or less gradually into the tissues covering the portio.

If the cervix is lacerated, the neoplastic histogenesis does not at this stage of development involve the angle of the tear, but is **usually confined to the posterior lip,** while erosion more commonly covers the whole circumference of the os, including the sulci formed by the laceration.

The sense of covering, rather than of penetrating into, or displacing the structures of the cervix, is a valuable diagnostic point of erosion, and when it can be realized, will, in the initial stages of development, aid in distinguishing between malignant and non-malignant pathology.

Through the speculum, the friability of the tissues is more successfully tested, for the sharp curette can be used, and thus the extent and depth of the neoplasm defined. The readiness with which the volsellum tears through the diseased structures, will also indicate the depth of the neoplastic process. This friability, the significance of which is the absence of tissue construction that the new growth shows, extends into the cervical canal, and it is found upon attempting dilatation, that the structures will not stretch, they tear, which is the process by which the canal is enlarged.

Considerable confidence has been expressed in the local action of the *Sulphate of Copper,* to differentiate between epithelioma, and the various forms of erosion of the cervix. It is maintained that a 10 per cent. solution applied to epithelioma causes free bleeding, where, as when applied to glandular hyperplasia in any degree of development, the surface is simply blanched. Such a superficial test can never be more than a confirmation of other more certain diagnostic features.

By rectal examination valuable information may be obtained concerning the peri-uterine structures, and no case from which the

possibility of epithelioma cannot be eliminated should be dismissed without the assistance to diagnosis thus obtained. To gain all that the method will give, it may be necessary to make the examination under anæsthesia, which, considering the issues at stake, should not be objected to. The posterior wall of the vagina, the base of the broad ligaments, and the sacro-uterine space will come under the inspection of the finger in the rectum. As elsewhere pointed out the sacro-uterine ligaments are almost the earliest structures outside of the uterus to become infiltrated in epithelioma of the cervix, and a knowledge of the condition of the pouch lying between the sacrum and the uterus furnishes trustworthy data concerning the process going on in the uterine cervix. **The least thickening of the utero-sacral ligaments, or infiltration of the cellular tissue in connection with degeneration of the cervix, is almost certain to be caused by a malignant neoplasm,** and may be looked upon as strong evidence that the cervical disease is an epithelioma. Erosion of the cervix will not cause this, and we may confidently assert that the only pathological condition that in its early stages involves the structures of the sacro-uterine space, is epithelioma of the lower segment of the uterus. We cannot go to the extent of saying that this condition is indubitable evidence of such a pathology, but it can be said, that in the presence of infiltration of the structures of the sacro-uterine space, the cervical disease should be subjected to a rigid examination, and to the most radical treatment. I have never found such infiltration unassociated with epithelioma of the lower segment of the uterus.

With the advent of molecular necrosis epithelioma of the cervix is more readily diagnosed, for the differentiation from benign conditions will rest principally upon the peculiarity of the necrotic process.

The destruction of the neoplasm is in no sense an ulceration. Inflammation forms no part of it, and there is no attempt on the part of the germinal cells to reconstruct, or to develop into mature bodies, as is the case in ulceration. Herein lies the distinctive character of the breaking down epithelial neoplasm. The necrosis is nothing more than the casting off of the dead outermost parts of the growth, and the base of this excavation

is made up of the same structures that are thus desquamated, its cellular elements being pushed forward by excessive proliferation of underneath cells, which are in turn cast off by a similar necrotic process.

Whether the neoplasm protrudes much beyond the level of the os, or whether it develops into a fungoid, cauliflower mass that fills the vagina, the characteristics of destruction are essentially the same, **the process is caused by the abnormal vegetative proliferation of cells, without reconstructive function,** and the surface of the parts remaining is similar to that portion that is cast off, and possesses the characteristic friability of the early neoplasm.

While infiltration into the surrounding tissue is taking place,—it always extends beyond clinical detection,—there is to the feel and sight a sharply defined line between the necrotic process and its connective tissue matrix. **The boundary of the excavation** is hard, and darker than the surrounding mucosa, and is irregular in outline. It does not blend gradually, either in color or consistence, into the mucous membrane, or structure of the new growth. In this respect necrotic epithelioma of the cervix differs widely from all other diseases of the lower segment of the uterus. In **cervicitis, and sloughing fibroid,** both of which resemble in many respects the advancing stages of epithelioma, this indurated boundary line is not well marked, and the ulcerating process seems to pass into the surrounding inflamed tissues.

Tubercular ulceration of the cervix presents sometimes the appearance of a breaking down epithelioma, its edges being sharply cut, but tuberculosis is generally a multiple lesion, appearing in small isolated spots on the portio, and os. Moreover the bleeding is not active from the tuberculous ulcers, and there are frequently primary multiple deposits in the lungs, and other organs, (*see Chapter IX*).

Epithelioma, that has passed into the stage of molecular necrosis, may, without attention to its clinical history, be at first mistaken for **primary syphilis of the portio.** Chancre, however, presents a solitary ulcer, not involving any considerable extent of surface. It is painless and shallow, does not bleed

easily, and gives rise to a discharge that possesses a peculiar metallic odor. The characteristic punched out border of chancre is usually present, and there may be considerable induration of the surrounding tissues, but the base of the ulcer is not friable, and the area of induration is red, showing its inflammatory nature. The development of secondary symptoms will determine the specific character of the local lesion.

More difficulty may attend the differential diagnosis between a necrotic epithelioma, and **a tertiary syphilide of the portio.** If a history of the primary sore can be obtained the diagnosis is simplified, but this is not always forthcoming, either because of ignorance on the part of the patient, or a desire for concealment. Tertiary syphilis of the portio may assume the form of a circumscribed gumma, or diffuse infiltration, which breaking down, present an unhealthy ulcerating surface, with indurated edges. The base of the ulcer may become fungoid, but this mass does not possess the degree of friability of an epithelial neoplasm, nor does it bleed as readily when touched, or give rise to such continuous oozing. The microscope will determine cases that still remain in doubt.

As molecular necrosis becomes more extensive, involving the tissues of the portio as well as those of the cervical canal, the condition cannot be mistaken for any other. **By the process of destruction, the cervix becomes a crater-shaped opening,** the rectovaginal portion finally disappears, and in the place of the uterus there exists a vast cavity, the walls of which are made up of neoplastic necrotic tissue. By this time, though additional data are not necessary, metastases, and cachexia are well developed, and complete the diagnostic picture of malignancy.

The diagnosis between the epithelioma, the papillary squamous variety that has increased in size to such an extent as to fill the vagina, and is subject in spots to molecular necrosis, and a sloughing polypoid fibroma of the cervix, is sometimes difficult.

The diagnosis will rest *first*, upon the degree of friability of the mass, and *second*, upon the ascertainment of the extent to which the os is involved in the new growth. Epithelioma grows from a considerable portion of the circumference of the

os, and as it presents in the vagina, seems to be a neoplastic elongation of that portion of the lower segment of the uterus. Fibroma is attached by means of a pedicle to only a part of the os.

The hæmorrhage is liable to be more profuse in fibroma than in epithelioma, but more active and long-lasting oozing follows manipulation of the epithelial growth. The discharge from both neoplasms contains necrotic shreds, but the odor of that from epithelioma is more penetrating and difficult to remove from the hands, than that belonging to the connective tissue neoplasm. (Deodorization is best effected by washing the hands in turpentine, after which they should be thoroughly dried.)

In every case of doubtful diagnosis a specimen of the growth should be submitted to the microscope, and while the laboratory does not furnish the final dictum, in connection with other groups of symptoms, it may prove, or disprove the malignancy of the new formation.

There has been observed with sufficient frequency to suggest more than a casual relation, in epithelioma of the lower segment of the uterus, **well marked angioma of the abdominal walls.** These spots are raised, reddish in color, do not fade on pressure, and vary in size from that of a pin head to that of a lentil. Just what the relation is between the uterine disease and the skin affection has not been determined. It is not known if the angiomata are caused by the internal growth, or are congenitally weak spots that become apparent under the influence of the toxines of the pathological morphology. Their presence may suggest central malignancy, while their absence is to be regarded as of purely negative import.

The diagnostic evidence from an examination of the blood is without significance in the early stages of epithelioma of the cervix, being represented by a mild secondary anæmia, and at no time can the condition of the blood be regarded as conclusive. Beyond the conditions common to all infectious diseases there is probably no material alteration in the constituents of the blood before the neoplasm begins its process of dissemination, and even after the system becomes thoroughly con-

taminated, and metasteses numerous, the most careful analysis has hitherto failed to discover wandering germinal cells. The changes are limited to a slight leucocytosis. The hemoglobin is reduced, and the erythrocytes are diminished in number, and irregular in size and shape. As the system becomes more profoundly toxic these conditions are accentuated, and the blood corresponds to that which is characteristic of pernicious anæmia.

The Treatment of Epithelioma of the Uterine Cervix. Our ability to cope successfully with the treatment of epithelioma of the lower segment of the uterus, will depend upon a recognition of all those factors that either constitutionally or accidentally contribute to the local errors in cell genesis, and their elimination as causative agents before such errors arise. Failing in this, and it must be acknowledged that our present knowledge of the beginning of malignant diseases does not offer any very encouraging prospect of accomplishing much in this direction, our attention will be directed to the earliest possible recognition of the neoplastic process, while it is still a local error in cell growth, and its removal before dissemination takes place, for after that no treatment will be successful in eradicating the germinating neoplastic cells, or in correcting their vicious toxines.

The constitutional factors to be corrected, as we have seen, are not an inheritance to the development of malignant neoplasms, but an inherited, or acquired error in metabolism, that shows itself in a tendency to inflammation, and the formation of rapidly developed immature cells under conditions of slight irritation; a degree of irritation, save in the presence of such a dyscrasia, that would cause nothing more than the normal reaction necessary for repair.

The uric acid diathesis, scrofula, and tuberculosis, stand foremost among the constitutional factors that make for the development of epithelioma of the uterine cervix, and these must be dealt with in all cases that are likely to be subject to the accidents that attend the life of the reproductive organs. In other words, we would go a long way toward immunizing against this scourge of civilization, if all scrofulous, lithæmic, and

tuberculous women are treated, and their dyscrasias held in control before they are allowed to marry and bear children. This question especially concerns the general practitioner, who by careful prescribing, and hygienic directions, will render the gynæcologist's duties lighter, and reduce the present mortality from malignant diseases of the uterus.

The accidental factors that contribute to the development of epithelioma of the uterine cervix, are associated with malpositions of the uterus, and the injuries of parturition. As prophylactics therefore the position of every uterus should be corrected, and the obstetric canal protected as much as possible from injury during and after the passage of the child. The latter injuries are not confined alone to laceration of the uterine os, and cervical canal, but parturient trauma that results from long-continued pressure on the entire canal without causing lacerations, interferes with the circulation to such an extent as to be followed by regions in which nourishment is imperfect, and therefore becomes a possible source of abnormal cell proliferation. Much of this can be avoided by careful accouchment, and by abstaining from meddlesome interference with nature's delivery.

Foremost in **the preventative treatment of epithelioma** of the uterine cervix is careful attention to all inflammations, and erosions of the os, for by correcting such errors of nutrition and cell growth, we undoubtedly eliminate most important causative factors in the development of epithelioma.

There is but one treatment of a recognized epithelioma of the uterine cervix, provided the pathology is local, and not disseminated into the peri-uterine cellular tissue, or invaded the deeper pelvic glands. Under such conditions, **the diagnosis assured, removal of the neoplastic tissues should follow.** Palliative and temporizing methods of treatment are not to be considered. No method of treatment that has not the complete removal of the disease area for its object, should be followed; nothing less than eradication is to be thought of. (*See Hysterectomy, Chapter XII.*)

To avoid more radical measures, various escharotics, and chemicals have been applied to the growth, with the object of destroying

the neoplastic cells, and leaving the healthy matrix tissue untouched, save as it would be stimulated to repair. They have failed in their pretentions, and occupy no position in well accredited therapeutics. These methods of treatment apply only to the inoperable cases of cervical epithelioma, and as such will be discussed later.

At present **two methods of radically removing epithelioma of the uterine cervix claim recognition.** One is near perfection in its conception, and technique—**vaginal, and abdominal hysterectomy,** which to avoid repetition will be described in a separate chapter. (*See Chapter XII.*) The other is in its infancy, but even now promises to do much for the cure of this lethal disease—*the X-ray, the Radium rays,* and *Cataphoresis.*

Advocates of the use of the X-ray in malignant growths are enthusiastic, both as to its present value, and future possibilities. It has accomplished much in superficial epithelioma, possessing a selective action upon epithelial cells, and in a few cases has apparently arrested the growth of a uterine neoplasm. No actual cures, in the sense of a complete removal have been reported. The difficulty in applying the X-ray to uterine pathology, lies in the deep situation of the new growth, and the fact that its therapeutic action is rather superficial, and does not penetrate much below the surface of exposure.

This method of radical treatment is mentioned here, not because of what it has done in the treatment of epithelioma of the cervix, but because of the possibilities it seems to offer. That its power and therapeutic application have been sounded, we must not believe, nor is it probable that the perfect methods of its application are known. The use of the X-ray should be confined to the electrical specialist, and does not properly fall within the domain of the surgeon, or the gynæcologist.

Radium, and **Theorium,** recent claimants in therapy, possess some valuable qualities that do not belong to the X-ray. The rays of these remarkable metals, and of all the radio-active substances, penetrate solids more deeply than the X-ray, and for this reason are better suited to treat neoplasms situated at a distance from the surface of the body. Exposure to the radium

rays,—thus far there have been demonstrated three separate rays, A. B. C.—is followed by profound action upon tissues. Continued exposure causes destruction and ulceration, but if the application is made for a shorter time, the tissues become perfectly blanched, and remain lifeless.

Thus far we know next to nothing of the action of radium, or the method by which the most complete results can be obtained, but its effect upon tissues is so penetrating, that we may hope continued research will place this substance among the strong weapons to be used against malignant neoplasms of the uterus. Agreeable with the known antagonism of light to tubercular bacilli, possibly we may expect radium, a fragment of the sun, to accomplish more in this disease, than in epithelial neoplasms.

Following closely the therapeutic action of the X-ray, and the radium rays upon malignant neoplasms, are the results obtained from **the application of Cataphoresis to epithelioma.** By availment of the electrical current to carry a material—*the nascent salt of mercury,*—into the surrounding tissues, where it acts as a poison upon the protoplasm of the neoplastic cells, exerting little if any action upon healthy cells, it is said to be possible to reach outlying nodules more effectually than by any other method, save the removal of the uterus. The value of the cataphoric treatment of malignant diseases will depend, *first*, upon the obtaining of a chemical that when brought in contact with the neoplastic cells is destructive of their life; and, *second*, upon the certainty with which such material is conveyed to the atypical growth by means of the electrical current. Neither of these essentials to a successful application of this treatment have been satisfactorily demonstrated; the matter seems to rest among the possibilties that are worthy of more careful investigation.

The Treatment of Inoperable Epithelioma of the lower segment of the uterus, and by this is meant cases that have advanced to the degree of pelvic infiltration; cases in which molecular necrosis is progressing, the broad ligaments are invaded, the sacrouterine folds thickened; where there is lymphatic involvement, and possibly remote metastases, should be nothing more than

palliative. The disease cannot be eradicated, or its progress delayed, and our concern will be to make the patient's life endurable, to relieve suffering by any means in our power, to prevent a dangerous loss of blood, and to deodorize the discharge, and render it as bland as possible. These conditions for treatment will be met by local applications, and will follow the well recognized tenets of surgical dressings.

But little advantage is to be anticipated from dressings having a selective and specific action upon neoplastic epithelial cells. No action so exerted is capable of eradicating the pathological, germinal elements, either from the local focus, or as they are disseminated through the system, and other conditions of antiseptic dressing should not be sacrificed to any supposed benefit to be derived from such applications.

With this stage of the disease the time has passed for even attempting a cure, and there is no place in the treatment for the use of destructive chemicals, which if they penetrate beyond the neoplastic area, and attack the outlying zone of protective connective tissue, induce such a degree of irritation as to favor the continuation of epithelial infiltration. It goes without saying, that no local treatment can have the slightest effect upon metastatic growths.

These considerations, and clinical experience, lead me to regard with disfavor, any but **simple local treatment in inoperable epithelioma of the cervix.** We must do something for the patient's mental condition, as well as endeavor to remove the physical state attendant upon local tissue necrosis, and therefore will not refuse the sufferer treatment, but this treatment should be on the lines of antiseptic surgery, without expectation of attacking the malady.

The local treatment of inoperable epithelioma of the lower segment of the uterus, should begin with **a thorough curettement of the neoplastic structures.** For this purpose a dull curette is the better instrument, and is quite sufficient to remove all of the cell mass that can safely be taken away. The scraping should be everywhere carried down to the matrix structures, even though the excavation thus made is extensive. If the case is far advanced when the treatment is begun, and the bladder

and rectal walls thin, great care must be exercised when curetting these regions of the growth. The posterior or rectal aspect may be passed over on the forefinger of the left hand in the rectum, and the bladder not wholly collapsed, is guarded against injury, by applying the force of the instrument downwards not forwards, against that viscus.

The only advantage from curetting the cervix in advanced cases of epithelioma, is a temporary lessening of the discharge. This is for a short time reduced, and as for a period after the operation it contains but little necrotic tissue, the odor is also controlled, and its irritating character rendered less pronounced. The course of the disease is not at all altered.

During the curetting there is frequently free bleeding, but if the operation is rapidly performed, this need not disturb the surgeon; should it continue when the curetting is completed, it may be necessary to take measures for its control. The whole of the curetted surface can be gone over with the Paquelin cautery at a white heat, but this is difficult to accomplish, especially if the cavity is filled with blood.

Nothing in my experience controls the hæmorrhage that follows scraping the uterus, as quickly and permanently as *turpentine*. If necessary, the cavity may be packed with gauze saturated with *turpentine*, but I am opposed in general to packing in these cases, and endeavor to control the bleeding with gentle swabbing. Free drainage should be encouraged at all times in epithelioma of the uterine cervix, and any technique that retains discharge is dangerous, by predisposing to tubal and abdominal infection.

Occasionally the hæmorrhage is only temporarily controlled with *turpentine*, and returns even after its thorough application to the curetted surfaces. In such cases either the uterine wall is soft and lax, its musculature not assisting in closing the blood vessels; or the contractile power of the blood vessels themselves is deficient, and needs to be stimulated to activity.

While *Ergot, China, Millifolium, Ipecacuanha, Sabina,* and like remedies may be useful, for prompt and lasting action in uterine hæmorrhage following curettment, I have learned to

place reliance upon *Stypticin, (Cotarine Hydrochlorate*), *Hydrastinine,* and *Adrelanine.*

Stypticin finds its especial usefulness in the cases under consideration, when after curettment the uterus contracts fairly well, but the oozing continues from the open vessels, for the action of this hæmostatic is not upon the musculature of the uterus, but is expended upon the vaso-motor nerves of the genital tract. Stypticin is useless before curettment ; as the vascular channels of the neoplasm contain no walls, they are not under the control of the vaso-motor system of nerves. It therefore is necessary to remove the soft neoplastic tissue before this drug can act upon the vascular channels of the underneath, more or less firm matrix structures.

In addition to its hæmostatic action, Stypticin being one of the products of the opium alkaloid, narcotine, possesses a well-marked sedative action.

To obtain prompt action from this drug, **it should be administered hypodermically,** three grains being injected deeply into the gluteal muscles; at the same time to insure more permanent hæmostasis, two grains may be administered by the stomach, every two or three hours. It is not a small advantage that the use of Stypticin may be continued for a considerable length of time without producing other than a curative action.

Hydrastinine (*Hydrochlorate of Hydrastinine*), is very similar in action to Stypticin, to which it is related chemically. It differs however, in that it stimulates the uterus to rhythmic contractions, probably not by direct action upon the neuro-muscular appartus, but indirectly by way of the central nervous system. **Hydrastinine, therefore, is especially indicated,** when in addition to the open vessels, the uterine walls are atonic, and show no disposition to contract.

Here, again, to obtain immediate action, Hydrastinine should be **administered hypodermically,** five to fifteen drops of a two per cent. solution being injected deeply into the gluteal muscles. Considerable irritation is liable to follow the hypodermic use of Hydrastinine, but the prompt application of moist heat at the site of the puncture, will tend to prevent this result. Internally, Hydrastinine should be administered

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in half, to one grain doses, every four or five hours. Its action is depressing upon the heart, and therefore must be carefully watched.

The local use of Adrelanine, is of service in persistent, not active oozing from the uterus after curettment. Applied in a $\frac{1}{2000}$ solution, it will temporarily control the hemorrhage. Adrelanine also induces permanent contraction of the uterine musculature, and may be injected directly into the lower segment of the uterus, or hypodermically, (*Adrelanine chloride*) into the gluteal muscles. I have obtained satisfactory results from the conjoined internal use of fifteen drops every three or four hours.

In the course of the treatment of inoperable epithelioma of the lower segment of the uterus it may be necessary to repeat the curettment more than once, but we should remember that each time the neoplastic matter is scraped away, just so much substance that cannot be replaced with healthy tissue, is removed, and correspondingly the walls between the uterus and contiguous organs, are rendered thinner.

The use of escharotics after curettement, which a decade ago, before the establishment of aseptic surgery obtained favor among surgeons, has justly fallen into disuse, and will only exceptionally now be called for. Cures never follow their use, and they are liable to give rise to unnecessary suffering. At the best they only serve to delay the certain issue.

Of escharotics, *Chloride of Zinc* is the best, and when the local breaking down is not extensive, though the pelvic involvement places the disease outside of a justifiable operation, may be used with some confidence that it will temporarily stay the neoplastic process. The salt should be applied in the strongest available form, equal parts of the chemical, and moist flour being spread on a strip of lint, the dry end of which is packed up against the medicated portion. The utmost caution is necessary to protect the vagina from an excess of the zinc salt. This is accomplished with pledgets of cotton soaked in a strong solution of bicarbonate of Soda, and by tamponing the vagina with strips of gauze soaked with the same solution.

The tampon remains in place for two days, and after its re-

moval, four hourly douches of Creoline, ½ to 1 per cent. given. The eschar caused by the zinc continues to come away with the douche for two or three weeks, after which the surface of the ulcer assumes an appearance of healing. For a variable length of time the discharge is controlled, and the sapræmic toxæmia held in check. The improvement however is temporary, the neoplastic process returning with increased malignancy.

I have never seen any advantage follow the use of the actual cautery—**Pacquelin's,**—**or the galvanic cautery, after curettement** for epithelioma of the cervix. The resulting eschar is composed of neoplastic structures only, and when it separates from the basement structures, leaves them in the same condition they were prior to the thermic application. It has even seemed to me that the local irritation induced by heat, rather favored cell proliferation in the germinal elements that were not reached, and that after the separation of the eschar, the neoplastic process received a fresh impulse to grow.

If escharotics are not to be used after the curettment, I swab the entire surface of the neoplasm, with 95 per cent. *Carbolic acid*, exercising care to protect the vagina from its corroding action. The vagina is then lightly packed with Iodoform gauze, which is allowed to remain for twenty-four hours, when it is removed, and a system of local treatment instituted.

I am convinced that it is a mistake to give any place to **vaginal tampons in the treatment of inoperable epithelioma of the uterine cervix.** The discharge being septic, and foul, the object should be to provide free drainage, which cannot be accomplished if the vagina is packed, or occupied with a tampon. A positive danger lurks in any method that retains a muco-purulent discharge containing necrotic tissue, within the genital canal. Such a discharge may be absorbed by the lymph channels, or may be forced back through the Fallopian tubes, so gaining an entrance into the peritoneal cavity. Therefore it is not my practice in such cases either to repack the vagina after removing the packing that follows curettment, or to use a vaginal tampon.

To enumerate the various drugs that have been used in the

local treatment of epithelioma of the uterine cervix, would serve no other purpose than to illustrate the fertility, and imagination of the human brain. With a more correct understanding of the pathological processes that are taking place, and more accurate knowledge of cell genesis, the therapeutics have become restricted, and we can now select from a greatly reduced number of drugs for local application.

The objects to be attained in the local treatment of inoperable cervical epithelioma, are mainly three fold. *First*, the maintenance of aseptic conditions, which will naturally include deodorizing of the discharge; *second*, the control as far as possible of the neoplastic cell proliferation, which is accomplished by means of desiccating agents; and *third*, sedation, which includes relief of the local and remote pains and suffering consequent upon the advance of the neoplasm, and attendant upon the irritating discharges.

Save for the suffering it entails, *Formalin* is quite the ideal application for epithelioma of the cervix. It is a powerful germicide, and deodorant, and at the same time desiccates the epithelial cells with which it comes in contact. Applied to the neoplastic surface in a two per cent. solution, it arrests the process of necrosis, and controls and deodorizes the discharge more completely than any other drug that I have used. But the pain following its application is sometimes so severe as to be prohibitive, and in less strength than that indicated, the same tissue effects are not obtained. I have tried various methods to overcome this objection, but all have failed save the preliminary use of cocaine, which to be effective, must be applied in a ten per cent. solution to the ulcerated surfaces for fifteen minutes before the application of Formalin. The danger attending the use of such a strong solution of cocaine to so large a surface, is minimized by the slow absorption that takes place through neoplastic tissues, we cannot however, even under such circumstances divest the use of this drug of danger. I have used *Orthoform* for the purpose of rendering the application of Formalin less painful, but with indifferent success.

In the use of formalin for an epithelioma of the lower

segment of the uterus, nothing is gained by too frequent applications. One or two applications in the course of a week, are quite sufficient to obtain the best results; oftener than this causes more destruction than we wish, and hastens the process of excavation.

After swabbing the surface—care must be taken to avoid over-saturation of the swab, for little is required to effect the diseased structures, and the formalin should not come in contact with the healthy vagina,—I insufflate the surface with Aristol and Bismuth, equal parts. This powder is not only antiseptic, but adhering to the surface of the excavation, prevents the douche, which will be given twice or three times a day, from immediately coming in contact with the neoplastic tissue.

Tincture of *Iodide*, and *Carbolic acid*, in equal parts, are useful, especially if the surface of the excavation is fungoid, and bleeds easily when touched.

Hydrastis fluid extract, and *Carbolic acid* in equal proportions may also be used in similar conditions.

Powdered *Hydrastis*, and *Bismuth*, exert a soothing action, and may be applied to the surfaces after they are thoroughly cleansed.

Nitrate of Silver, twenty grains in one ounce of water, will sometimes reduce granulations in the underlying uterine tissues, after curettment.

Chromic acid possesses the advantage of attacking diseased stuctures only, and in a saturated solution desiccates epithelial cells, and delays necrosis. *Methylene blue*, in the form of a pencil, applied to the surface of the ulceration, undoubtedly controls both odor and discharge, but the staining that attends its use relegates it to the position of a final resort, especially as no advantages can be claimed for it over other and more surgically elegant materials.

Much of the patient's comfort will depend upon the vaginal douche and its administration. *Carbolic acid* remains the most commonly useful douche, and because of its analgesic properties, may be given even when there is considerable dermatitis present. But when vulvitis and dermatitis are marked symptoms of the

late stages of epithelioma, an alkaline solution—*Bicarbonate of Soda*—or a solution of common salt, will be necessary to relieve the intense suffering; I have sometimes found relief from a weak solution of the *Acetate of Lead, Carbolic acid*, and *Morphine*.

Applications of a five per cent. solution of *Orthoform* to the entire vagina and external parts, will sometimes afford relief from the intense suffering.

Sterilized Olive oil, to which is added ten per cent. of *Eucalyptus*, is a deodorant, at the same time it is soothing to the dermatitis, and protects the mucous membrane and skin from the foul discharge with which they are constantly bathed.

An emulsion of Iodoform in Olive oil is most soothing. The odor, however, will sometimes effect the stomach, and so exclude it from use.

Until dermatitis develops, *Creoline* $\frac{1}{2}$ of 1 per cent., leaves little to be desired for douching. The action of this coal tar product is especially efficacious in the presence of cellulitis of the vagina, but its irritating properties counterindicate its use after dermatitis and vulvitis have developed.

The well known irritating **action of the bichloride of mercury on the skin** is opposed to its use for a douche in any stage of epithelioma of the uterine cervix. The certain effect that the discharge will have on the vagina, and the external genitals, indicates the propriety of anticipating such sequela, by rejecting any application that can destroy the epithelial layers of the skin.

The late and closing stages of epithelioma of the lower segment of the uterus, demand the free use of sedative drugs. By this I mean the systematic use of opiates in doses sufficient to control pain, even though the patient is thereby rendered mentally dull, and unresponsive. *Morphine* is the most certain remedy for this condition, but the systemic effects are so unfortunate, that we should delay its use until other less harmful drugs have ceased to afford the necessary relief. With the beginning of the stage of suffering, knowing the entire hopelessness of the case, I hold it to be the surgeons duty to commence a course of sedative treatment;—*Codeine*, followed by *Opium*, and lastly *Morphine*. *Codeine* and *Opium* are best administered in the

form of rectal suppositories. They thus act promptly, and with a minimum disturbance of digestion. When Opium has ceased to relieve suffering, and the quantity administered should be wholly regulated by the effect produced, Morphine must be substituted. This should be given hypodermically, and the same rule, in doses sufficient to relieve pain, will govern its administration.

I have elsewhere spoken of *Kali phos.* in connection with the relief of the pain of epithelioma of the uterus. In the early stages it is useful, but in the later stages nothing in my experience but Morphine will prove of any use.

Cundurango is credited with relieving the suffering that attends malignant diseases of the uterus. My use of this remedy does not give me confidence in its ability to do so.

The foregoing palliative treatment of epithelioma of the lower segment of the uterus refers to inoperable primary cases. **Cases in which the neoplasm has returned after hysterectomy,** present somewhat different problems for consideration. In the first place the pelvic organs are more liable to be involved by extension of the pathology, the peritoneal barrier having been broken down by the operation. Hence it is seldom advisable to curette the recurrent growth. In doing so we are almost certain to penetrate the abdominal cavity, or enter one of the pelvic viscera.

For like reasons the intestinal canal is more liable to suffer infiltration, and hence intestinal obstruction is common with the returning growth. Our chief efforts therefore will early be directed to maintaining the patency of the intestinal canal. In other respects the treatment of the local return will not differ from that laid down for the care of the inoperable primary cervical neoplasm.

CHAPTER XII.

REMOVAL OF THE UTERUS.—SUPRA-VAGINAL HYSTERECTOMY. —VAGINAL HYSTERECTOMY.

Any discussion involving the removal of the uterus will take into consideration two basic propositions: *First*, will the patient be permanently, or even temporarily benefitted by the operation? *Second*, are the risks outweighed by the advantages that may reasonably be expected to follow the operation?

In the light of modern surgery, the second proposition may almost be dismissed from the *pros* and *cons*. What is necessary to be done, and what will accrue to the benefit of the patient, surgery does not hesitate to undertake. The risk to life may be great, and the manipulation attended with almost insuperable difficulties, but these considerations assume a secondary importance in view of the restoration to health that the operation promises.

Unknown quantities, the personal equation, enter into every department of operative surgery, and will continue to influence its results, but the factors under our control and within our knowledge that go to make up operations, however formidable they may be, will not deter the surgeon from operating if the patient can thereby be benefited.

The question therefore of removing the uterus, will rest principally upon the first proposition; will permanent or temporary benefit follow the operation? Each case must be treated upon its individual merits, but the question will finally resolve itself into a matter of statistics, and these will be of value, as they relate to the special disease treated. Factors that effect statistics enter into the removal of the uterus for malignant diseases, that in no measure concern the same operation when performed for removing benign growths, or for the purpose of relieving mechanical pressure, or reflex symptoms. In the one, the

limits of the pathological process not only determine the propriety of the operation, but set their stamp on its success; in the other, the questions to be considered are for the most part anatomical, and relate to the mechanical obstacles to be overcome.

There will arise the further question between the vaginal route, and the abdominal route. Statistics in this matter seem in no small degree to be influenced by the individual operator, his skill in manipulation, and experience in selecting cases, but there can be little doubt that **the vaginal route offers certain fundamental advantages over the supra-vaginal operation;** advantages that are manifest in a lesser degree of surgical shock, more rapid recoveries, and a minimum risk of post-operative complications. Therefore, when the object to be attained, and the nature of the disease to be removed, will allow of their accomplishment through the limited space offered by the rigid pelvic outlet, the vaginal operation should always be given the preference over the abdominal operation.

The supra-vaginal operation on the other hand, offers the advantages of more thorough inspection, and a broader field for manipulation, advantages that count for much in the removal of a uterus of any considerable size, and when the operation must involve extensive dissection of the pelvis, as in malignant diseases that have invaded peri-uterine structures.

In all operations for malignant diseases the incisions must be carried through healthy structures, well beyond pathological tissues. This rule applies with especial force to operations undertaken for the removal of the uterus for malignant neoplasms. The cases suited for operation will be discussed later, but no radical operation for malignant diseases of the uterus should be planned upon lines that do not include the removal of the broad ligaments, the vaginal, and pelvic lymphatics. Only by the most radical methods can we hope for the success in these cases that we are justified in expecting from the resources of modern surgery. Our mastery of anatomy and physiology, our increasing knowledge of morbid morphology, demand nothing less than such perfection in technique as will insure the removal of any structure, not essential to life, if by so

doing we can look forward to the restoration of health. The justifiable extent to which such mutilation shall be carried, will then be made to depend upon the ability of the patient to withstand the shock of the operation. Mechanical difficulties are overcome, and we are referred back to the personal equation, the unknown quantity in the proposition.

The Selection of Cases for the removal of the uterus. The diseases of the lower segment of the uterus for which hysterectomy will be indicated, are fibro-myoma situated in the cervical walls, sarcoma, epithelioma, and tuberculosis.

Reference has been made to the enucleation of fibroids situated in the anterior and posterior cervical walls of the cervix, and the limits set for such conservative operations. In general terms it may be stated, when a fibro-myoma of the cervix that must be removed—the conditions demanding operative interference relate chiefly to pressure symptoms—cannot be successfully enucleated through the vagina, a supra-vaginal operation is indicated, and it is more than probably that removal of the uterus will be necessary, for such fibroid tumors frequently dissect between the layers of the broad ligament, and extend on the anterior and posterior uterine walls—*sub-peritoneal*—as the case may be, or are complicated with the development of other uterine fibromata, presenting conditions that render a successful operation upon the cervical tumor alone, impossible.

Abdominal Hysterectomy for a Fibroid Tumor of the Uterine Cervix, may present formidable propositions for consideration, and involve extensive mutilation of the pelvic viscera. Our chief concern will be with the ureters, and the enlarged and adventitous blood vessels that supply the neoplasm with nourishment, and those that return the blood into the general circulation. In dealing with cases characterized by such an enormous development of blood channels, it is a safe rule, and one that should always be followed, to tie the vessels between hæmostatic forceps, leaving the proximal one in position, and removing the distal forceps after the ligature is tied. The field of operation by this manoevure is kept free from blood, save that which comes from capillary oozing, and we may proceed with the necessary

dissection, unhampered by obscuration of the field of opera-
tion. The intimate incorporation of the ureters with fibroid
tumors developing from the cervix, and extending between
the peritoneal layers of the broad ligament, may result in in-
juring these ducts during the removal of the uterus. We may
almost with certainty conclude that tumors of such size and
development are complicated with misplacement of the
ureters, and therefore a preliminary step of the hysterectomy
will be to map out the urinary ducts before attempting any
operation on the broad ligament. Such cases are, however,
proper subjects for operation; the difficulties of technique
will not stand in the way of the removal of the uterus and peri-
uterine structures.

In the presence of pressure on pelvic organs, and the pelvic
blood and lymph circulation, so uncertain is the effect of the
menopause in reducing fibro-myoma, especially of the soft
variety, that the removal of the neoplasm should not be
delayed in the anticipation of the possible therapy of the
climacteric.

**The propriety of a hysterectomy for sarcoma, tuberculosis, or epithe-
lioma of the lower segment of the uterus,** all of which may for con-
venience of classification, be regarded as malignant conditions,
will rest entirely upon the extent of the local disease, and the
degree of general distribution. An operation for either one
of these diseases is justified, only upon the assumption that
the pathology is entirely local; that the cell degeneration is in
no sense an expression of, or associated with, a constitutional
state, and that removal of the local disease warrants a reason-
able expectation that a cure will follow.

On the other hand, if the local disease is extensive, if the
cervix is deeply destroyed, if the utero-sacral ligaments are
indurated, and the pelvic and inguinal glands enlarged; if there
is sciatic or crural neuralgia; if there is gastro-intestinal irrita-
tion, and if there are evidences of faulty metabolism, it may
well be doubted whether any useful purpose is served by an
attempt to remove the disease. When the malignant new
formation has proceeded to such a development, it has in all
probability extended beyond the boundary of our examination,

and therefore we may remove by operation all, and more than
we find actually diseased, and yet there will be foci outside of
this line, and centres of pathological activity that have not
been, and cannot be reached.

My experience leads me to regard as inoperable, and to
relegate to **the class suited only for palliation,** cases of cervical epi-
thelioma that are certainly associated with peri-uterine in-
filtration, shown by fixation of the uterus, and in which there
are metastatic growths beyond the more easily reached pelvic
lymphatic glands, more narrowly the iliac glands. I consider
it impossible by any justifiable operation to remove all such
pathological centres, and many such from the nature and
method of the pathological dissemination must escape detec-
tion. Moreover, when a neoplasm that has advanced to this
stage of development returns after removal, it is in a more
virulent and rapidly fatal form than the initial lesion, being
distinctly nearer the process of embryonic cell formation.
The growth of granulation tissue when this forms a part of the
recurrent neoplasm, is favorable to the nourishment and
multiplication of pathological cells.

When the growth is local, and by this is understood before
the neoplastic cells have migrated beyond the uterus, either
by infiltration, or by means of the blood channels, and the
lymphatics, the disease is entirely within our control, and we
may confidently expect to eradicate it by prompt operative
measures,—complete hysterectomy,—but the neoplastic pro-
cess has passed beyond our control when its protective fibrous
envelope is broken down, and the essential germinal elements
have escaped from the initial disease focus. We cannot eradi-
cate the disease, and a major operation is not only profitless,
but actually harmful. Hysterectomy may possibly for a brief
period arrest the neoplastic development, but more suffering
attends its recurrence, which is inevitable, possibly because of
the organs that cicatricial contractions incorporate in the new
growth, than if it had not been interfered with.

It cannot be too strongly impressed upon the general prac-
titioner, and the laity, that **there is a distinct period of election for
operating on malignant diseases of the uterine cervix,** and that it is

their duty to realize the limitations of our art, and not to attempt the impossible in operative technique, or practice.

1. **Vaginal Hysterectomy for Malignant Diseases of the Lower Segment of the Uterus,** should always be preceded by a curettement of the diseased area, performed two or three days before the major operation. This is advisable for two reasons: *First*, it reduces the risk of contamination of the pelvis with neoplastic elements at the time of the operation; and, *second*, it affords firmer holding ground for dislocating the uterus during the hysterectomy.

For curetting the uterus it may not be necessary to employ general anæsthesia ; the uterus is very insensitive, and if the vaginal mucosa is not irritated, and the patient is not fearful of pain, the manipulation can be conducted without much suffering. Generally the discomfort connected with anæsthesia for the preliminary operation is so considerable as to greatly increase the dread of the impending hysterectomy, and therefore it should, if possible, be avoided. But if thorough curettement cannot be accomplished without general anæsthesia, the patient's objections must yield to the requirement for exact work.

Curettement must be performed with the same strict attention to aseptic preparation that belongs to the radical operation. After scraping the base of the ulcer it should be painted with carbolic acid, and packed with iodoform gauze. The gauze remains for twenty-four hours, after which it is removed, and the ulcer washed with *Peroxide of Hydrogen*, and dusted with *Aristol* and *Bismuth*. The iodoform gauze is then re-applied. The same procedure is gone through with in another twenty-four hours, which is the day before the hysterectomy. On the morning of the operation the nurse removes the iodoform gauze, which has been left long for the convenience of removal without a speculum, and gives a douche of *Bichloride of Mercury*, $\frac{1}{2000}$, followed by the already described preparations for a vaginal operation (*Page 67*).

At the time of the operation the ulcer is again cleansed, and its edges sewed together with strong silk, the sutures including the membrane of the portio-vaginalis. By this means the danger of contamination is reduced to a minimum.

The cervix is then seized with a volsellum;—my powerful
hysterectomy volsellum has blunt teeth, and a flanged handle,
by means of which the uterus can be rotated at the pleasure of
the operator. Before incising the mucous membrane, it is
well to exchange the speculum used during the post-operative
cleansing for one that is aseptic, and to swab out the vagina
with acidulated alcohol, otherwise some of the neoplastic ger-
minal elements may remain in the vagina and contaminate the
open wound.

A short broad-bladed speculum affords the best exposure of
the cervix, does not interfere with dislocating the uterus, and
gives ample room for ligating the uterine and ovarian arteries.
This is held by the assistant who sits at the operator's left, his
undivided attention being directed to adapting the position of
the blade to the changing requirements of the operation.

A single circular sweep made with my straight bladed
scalpel, through the mucous membrane, well above the line of
the diseased area, divides the structures of the cervix down to
the muscularis.

By firm traction upon the cervix, the surgeon controling
this with the volsellum held in his left hand, the uterus is
drawn out of its vaginal sheath, and the appearance of the thus
exposed cervical muscularis will indicate certain conditions
that may be encountered, and must be dealt with in the further
manipulations. If tortuous veins, which are only slightly in-
fluenced by traction upon the uterus, are found to occupy the
denuded structures, it may reasonably be assumed that venous
hæmorrhage will form an important factor in the operation,
and this condition will serve as an indication for that part of
the technique which looks to the control of hæmorrhage.

Further severing of the uterus from its connections with the
surrounding cellular tissue, to about the level of the internal
os, at which point the uterine arteries begin their tortuous
course over the uterus, is accomplished by means of slender
curved scissors. The small branch that is given off from the
uterine artery in the region of the vaginal fornix to supply the
external os, is usually severed in this dissection, and is the oc-
casion of the only hæmorrhage that need concern the operator.

It is temporarily controled by traction on the uterus, and ceases to bleed as soon as the main branch is ligated, which should be delayed until freeing the uterus posteriorly and anteriorly enables the operator to apply the ligature, on his left index finger as a guide, which has been entered behind the uterus.

I prefer to open the posterior cul-de-sac first, for through it the pelvis is more readily examined than through the anterior opening. The peritoneum, which has been reached by scissor dissection, is stripped away from the uterus as far over the fundus as possible, and then torn through, thus entering the pelvic cavity. Following this there is frequently a gush of serum, sometimes tinged with blood, which is frequently pathognomic of malignant disease.

The Denudation of the Uterus is an important step in the technique of vaginal hysterectomy, and will be influenced by two considerations; the advantage of forming a large peritoneal flap at the expense of the peritoneum removed with the uterus; and the danger of opening the rectum while attempting to enter the pelvis. In stripping the peritoneum from the posterior aspect of the uterus, the ball of the fore-finger is applied to the uterus, and with an undulating motion, the serous membrane raised from the underlying tissues. The direction of the force is not in the long axis of the uterus, but at a right angle to it, and away from it.

The opening in the cul-de-sac is conveniently enlarged to the required width—which will extend from the uterine attachment of one broad ligament to the other—by tearing with both fore-fingers, towards the lateral pelvic walls. For the subsequent successful manipulation of the uterus it is essential that the posterior peritoneal opening should be as large as the anatomical structures will permit, but occasionally *the utero-sacral ligaments* offer considerable resistance to the accomplishment of this object. If these structures, which present as tense bands on either side of the central opening in the peritoneum, do not readily yield to tearing, they should be divided with blunt scissors, cutting on the left index finger. There is no danger of wounding intestine if the finger in the cul-de-sac is used as a director. The ligaments can then be cut freely, a fact

that some operators disregard, preferring to tear them in the same manner that they enlarge the peritoneal opening. This practice is to be condemned, for it entails unnecessary injury, with consequent tissue irritation, and necrosis. Therefore, if the ligaments are not separated together with the peritoneum, it is best to cut them to the required extent.

Through the opening in the posterior cul-de-sac, the uterus, ovaries, tubes and broad ligaments can be thoroughly examined, and the subsequent steps of the operation planned in accordance with individual requirements. All adhesions that are likely to interfere with the delivery of the uterus, must be broken up at this stage of the operation, and we will generally at the same time be able to diagnose the condition of the ovaries, and the pelvic lymphatics, sometimes even the iliac glands come within our reach by bimanual examination.

The condition of the broad ligaments, most important to be made out in vaginal hysterectomy for malignant diseases, as infiltration occurs early in these structures, especially if the cervix is the primary seat of the disease, is readily ascertained through the posterior opening. The knowlege so acquired will determine whether the operation can be completed through the vagina, or whether it will be necessary to resort to a suprapubic opening. If infiltration involves the broad ligaments to any extent, it is useless to attempt to finish the operation by way of the vagina. The broad ligaments cannot be successfully cleared away from below, and to accomplish their thorough removal, the advantages offered by the superior opening are necessary.

It is sometimes desirable at this stage of vaginal hysterectomy, to close against absorption, the surface, extending from the upper limit of the vagina to the peritoneal flap, that is made by denuding the posterior aspect of the uterus. This may be done with two or three rather heavy silk sutures. The sutures if left long, serve the further purpose of enabling a more thorough inspection of the pelvis, and of controlling oozing from the *azygos artery* of the vagina.

After determining the condition of the pelvic organs through the posterior cul-de-sac, the anterior cul-de-sac will be entered

by much the same maneuvre as that adopted to effect the pos-
terior opening. But here the conditions are somewhat more
complicated, as the risk of injuring the bladder is very consid-
erable.

To avoid this unfortunate accident, but one, when it occurs,
that should be met by immediate repair of the tear in the
bladder, all the force used by the fore-finger must be directed
against the uterus, and the cellular tissue of Ritzius's space
lifted away from the uterine cervix. It is thus seen that the
operation is stripping the bladder, and but a small portion of
the peritoneum, off from the uterus. For this reason, and pos-
sibly because the mucous membrane seems to be more firmly
attached to the anterior than to the posterior aspect of the
fundus, the anterior peritoneal flap is short. **During the separa-
tion of the bladder, forcible traction must be maintained on the uterus.**
This not only controls oozing, but materially aids in the peel-
ing off process.

The opening in the peritoneum will be enlarged laterally
by tearing towards the broad ligaments, as practiced in
opening the posterior cul-de-sac, and *the utero-vescial liga-
ments* cut with scissors, keeping meanwhile close to the
uterus.

Probably one very potent cause of **the dissemination of malig-
nant neoplasms after operation** is compression of the growth, by
means of which its germinal elements are forced into the cut
tissues. **Additional space for manipulation can be gained in vaginal
hysterectomy, by a longitudinal incision made in the median line of the
anterior vaginal wall,** reaching as far forward as the urinary
meatus. This incision joins at a right angle, the curved
horizontal incision that opened the anterior cul-de-sac, and
will include the thickness of the vagina down to areolar
tissue. By everted tension upon the triangular flaps thus
formed, they are readily separated from the bladder by
blunt dissection.

This method of freeing the anterior attachment of the uterus
minimizes the danger of wounding the bladder, and furnishes
a large opening through which the uterus and adnexa can be
delivered. It necessitates more sewing at the conclusion of

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the operation, but this does not signify, in view of the additional advantages thus afforded for manipulation.

I have entirely discarded **the use of clamps for permanent hæmostasis in vaginal hysterectomy.** This use of the instrument cannot be regarded in any other light than as a surgical makeshift, and should never be resorted to when a ligature can be applied. The clamp retards healing, and when taken off leaves a line of dead tissue that can be removed only by sloughing and suppuration, conditions that our technique should seek to remove from all operations for malignant neoplasms.

The ideal method of securing hæmostasis is by means of absorbable ligatures ; the one drawback to their use is the uncertainty of obtaining perfect asepsis, and while the present methods of preparing catgut are comparatively trustworthy, cases that owe their origin to infected ligatures occur with sufficient frequency to introduce an element of uncertainty into every case in which absorbable ligatures are used.

My **method of tying arteries iu vaginal hysterectomy** is to use No. 2 chromic, 14 days catgut, when the ligature is to be dropped in the pelvic cavity, and does not remain in communication with external air, and to use silk when the pedicle is brought down into the vagina, and for closing the opening in the peritoneum. That is to say, I ligate the ovarian artery, and suture that portion of the broad ligament that remains above the pelvic floor with catgut, and apply silk to the uterine arteries, the pedicles of which are to remain in the vagina.

This practice is based upon the fact that perfectly aseptic catgut may become infected if exposed to septic microorganism, conditions that not infrequently obtain in the vagina as the result of post-operative contamination, in cases that run an otherwise aseptic course. Catgut ligatures, clean when introduced, are thus liable to become infected while lying in the vagina. Silk does not become infected as readily, and does not, if aseptic when used, offer as fertile a field for the cultivation of septic micro-organisms.

Commonly only two arteries on each side of the uterus require to be ligated in vaginal hysterectomy, the uterine, and the vaginal arteries. Adventitious branches sometimes given

off from these main trunks, and ramifying between the folds of
the broad ligaments, may need to be tied. These branches
are not usually of any considerable calibre, but sometimes give
rise to troublesome bleeding if neglected, inasmuch as their
origin is outside of the point at which the uterine artery is
ligated.

It is a fact to be remembered, that malignant growths are
generally attended with not only enlargement of the main
arterial and venous trunks, but with the development of many
new branches, undetected until they are severed at the opera-
tion. We must, therefore, be prepared to ligate more than
the usual number of arteries, and not depend implicitly upon
the normal anatomy of the text-books, or of dissection.

I find it convenient to begin hæmostasis by working from
the left side of the uterus. I therefore tie the left uterine
artery first. After traction upon the uterus is relaxed, the
artery can usually be felt pulsating against the fore-finger in-
troduced into the posterior cul-de-sac. By bringing the finger
forward against the posterior aspect of the denuded broad lig-
ament, and hooking it slightly downwards, the vessel will be
brought in position to apply a ligature.

The juxtiaposition of the ureters and the uterine arteries, may become
a source of embarrassment at this stage of the operation, but
the urinary duct will not be interfered with if we remember
that in the position of the patient in which we approach the
uterine artery for ligation, the ureter presents first, behind the
vaginal vault, coming from below, and posterior to the artery
and its two veins, curving forwards and upwards, in which po-
sition it lies about three-quarters of an inch away from the
cervix. By forcible traction upon the uterus, this distance is
more than doubled, the ureter not being drawn down with
the artery. Therefore, if a ligature is applied to the artery
from three-quarters of an inch to an inch from the uterus, the
latter organ being dislocated, there is slight danger of includ-
ing the urinary duct.

It is frequently possible to palpate a ureter between one index
finger in the posterior cul-de-sac, and another pressed against
the anterior vaginal wall. The duct is then recognized as a

tense resisting cord. Or it may be thought well to catheterize the ureters before attempting to ligate the uterine arteries. Such a procedure will not often be found necessary, the anatomical land marks being sufficient to serve as guides for the safe ligation of the arteries.

The position of the ureters is one of the weak points in vaginal hysterectomy for malignant diseases, for it is impossible by manipulations conducted alone through the pelvic outlet, to dissect away the entire broad ligament, a necessary part of the technique, without almost certain injury to them. To remove the broad ligament thoroughly, and with a minimum degree of risk of wounding the urinary duct, the ligament must be attacked from above as well as from below, and the ureter dissected out of the cellular structures, and the pelvic peritoneum.

Proceeding with the vaginal operation, the left index finger in the posterior cul-de-sac as a guide, a pair of hysterectomy forceps—Jacob's clamp is a convenient instrument—is applied close to the uterus, in such a manner as to include the uterine artery. These forceps reach from the external os to beyond the isthmus, and are in contact with the denuded surfaces only. They serve two purposes, to control oozing from the uterine mouth of the artery, and to assist in bringing down the structures to be ligated. If the pelvic outlet is narrow, the use of hæmostatic forceps had better be dispensed with, and the uterine arteries ligated without their aid.

A full curved Hagedorn needle armed with a No. 2 iron dyed silk, is then entered deeply into the broad ligament against the left index finger which has not been removed from behind the uterus, and carried around the uterine artery previously located. This ligature is passed about half an inch from the clamp, or three-quarters of an inch from the uterus, if it has not been applied, leaving sufficient space for the ligature to hold when the uterus is cut away. I prefer a Hagedorn needle in this place, for the reason that it is not liable to break when subjected to lateral strain, or to strain in the direction of its curve, and having a comparatively large-sized eye, will carry a heavier thread than the corresponding size of surgeons' needle.

The ends of the ligature are left long after tying, and held with an artery clip. This is perhaps a minor precaution, but it is one that I have frequently had occasion to congratulate myself that I had taken. I never trim the ligatures, no matter how many are left, until a final step of the operation, finding it convenient to draw them down, and thus assure myself of the condition of the pedicles.

The uterus is then cut away from the broad ligament as far as the point of the hysterectomy clamp, or for a distance of half an inch above the ligature, and if adventitious arterial branches persistently bleed, they will be ligated with fine silk; it is better to secure these as we proceed, than to trust to physiological hæmostasis, and be obliged to ligate them later, nature having failed to induce the necessary contraction. The right side is then treated in a similar manner.

Returning to the left side of the uterus, and having . escaped the ureter, it is safe and advisable to attack the broad ligament with more boldness than at the beginning of the enucleation, and endeavor to remove it as close to its pelvic attachment as possible. No arteries are normally encountered, and the broad ligament may be clipped with blunt pointed elbow scissors, still cutting on the left index finger as a guide, up to the ovarian artery, which can be ligated with safety well out towards the pelvic bone. Hysterectomy clamps are quite unnecessary here, and if used will obstruct the operative field.

The uterus having thus been freed from both broad ligaments up the ovarian arteries, the further technique will vary somewhat with the conditions encountered. If the ovaries and fundus of the uterus are large, it may be impossible without undue injury to the surrounding structures, to apply a ligature to the ovarian artery before delivering the uterine fundus through the anterior culde-sac. The ovary and Fallopian tube being brought out with it, the pedicle containing the ovarian artery and vein is by this manœuvre half rotated, and is readily ligated by transfixion.

My knot for tying the ovarian artery when the uterus is so delivered, is made with a Tait's pedicle needle, armed with No. 2 chromic catgut. The needle transfixes the pedicle, care being taken to isolate the artery, and is then withdrawn, leaving the

loop on the upper or distal side, and the two ends on the lower side. One end is caught in a pair of hæmostatic forceps, and carried underneath the pedicle to emerge on the upper side, where it passes through the loop left after withdrawing the transfixing needle. The ends are then drawn tightly together until the loop disappears in the pedicle, when they are tied, and left hanging, with a hæmostatic forceps attached.

Delivering the fundus through the anterior cul-de-sac is, however, to be avoided if possible, in operating for malignant diseases. It is difficult to prevent contamination of the peritoneal cavity with the neoplastic cells, for in bringing the body of the uterus forwards the cervix is carried backwards, and its diseased structures brought in contact with the exposed areolar tissue in the posterior cul-de-sac. **Preliminary sutering of the os** in a measure prevents this, but the accident is always possible, and this method of ligating the ovarian arteries should not be resorted too until all others have failed to accomplish hæmostasis. Ordinarily the longitudinal incision in the anterior vaginal wall will give sufficient space to ligate the ovarian artery without previous delivery of the fundus of the uterus.

Before delivering the fundus, while forcible traction is made on the uterus, the index finger through the anterior incision seeks the ovary and fimbria of the Fallopian tube, and following the latter, will reach the free border of the broad ligament—the *infundibulo-pelvic ligament.* The ovary and ligament can then be hooked down, and the ligature applied to the outer half of the structure, that portion through which the artery courses.

If this part of the broad ligament is unusually thick and broad, it is better not to include its full width within the ligature, but only that portion that holds the artery. We thus avoid an unnecessarily thick pedicle, and probable necrosis. The remainder of the left broad ligament is then cut through with scissors, and the uterus entirely freed from its attachments to that side of the pelvis.

By rotating the uterus outwards, and away from the right pelvis, unobstructed access is obtained to the right ovary and Fallopian tube, and the ovarian artery may be ligated either

by means of transfixion, including the *infundibulo-pelvic liga-ment*, or by isolation, without difficulty. The uterus, ovary, Fallopian tube, and a considerable portion of the broad ligament are then excised *en masse*. It will be observed that the treatment of the right side reverses the order in which the left side was operated on, that is, the ligatures are applied from above downwards. This method affords better opportunities for inspection of the right side of the pelvis, and more ample operative space, than if the securing of the broad ligament is continued from below.

If hæmostasis has been complete, and this will be ascertained by drawing down the ligatures for inspection of the pedicles, we will decide whether **to close the peritoneum,** or leave the vaginal vault open for drainage.

If the former course is adopted, the peritoneal flaps are brought together. It is not necessary, and may cause undue tension to include the portions of the broad ligaments that contain the ovarian arteries, in the line of union. This line conveniently extends from points in the ligaments about midway between the pedicles of the uterine and ovarian arteries. The ovarian artery thus remains intra-pelvic, and the uterine artery is placed outside of the peritoneal flap.

The horizontal vaginal incision is first closed with a continuous chromic catgut suture. Then, beginning on the patient's right side, the vault of the vagina is closed with a continuous iron-dyed suture that penetrates the base of the broad ligament, and as it is carried to the left side, includes both the peritoneal and vaginal walls. Reaching the left pedicle, it in turn is transfixed, and the suture secured. The vault of the vagina is thus completely closed. In passing this suture, it is quite essential for success, that it should be made to include the whole of the surface between the vagina and peritoneum, otherwise dead spaces may remain, and rapid aseptic healing placed in jeopardy.

I do not feel that much is gained, either in obtaining a strong pelvic floor, or in shortening the period of convalescence, by first **sewing the peritoneum and vagina together;** indeed I am inclined to think the resulting scar when this is not done, is stronger,

for it is made up of all the structures that naturally form the floor of the pelvis, and not chiefly of peritoneum, which is the case when the vaginal opening is converted into a button-hole by, as a preliminary step, sewing the peritoneum and vagina together.

While closing the peritoneum after vaginal hysterectomy is surgically the most perfect technique, the results are on the whole better, when the vagina is left open for drainage. The objection that the pelvic floor is liable to prolapse if the operative wound is not closed, I have not found verified in my practice. All the structures from which the uterus has been enucleated, peritoneum, cellular tissue, and vaginal walls, contract readily, and form a good supporting arch, that does not easily yield to intra-abdominal pressure.

To obtain the best results from the open method of the after treatment of vaginal hysterectomy, our technique will seek to prevent adhesions between the incised peritoneum, and the pelvic viscera. This is not always possible, even when the vaginal vault is closed, especially if there has been sufficient irritation of the serous surfaces to induce adhesive exudation, but the risk may be minimized by the manner of dealing with the peritoneum, and of packing the vagina.

For pelvic drainage I place a small piece of gauze, the distal end turned in, and free from threads, against each broad ligament, and between these one or more strips, that do not reach within the pelvis, but fill a space covered superiorly by the peritoneal flaps that have been previously adjusted with hæmostatic forceps, and anteriorly and posteriorly by the cellular tissue from which the uterus has been enucleated. This necessitates healing by granulation, but one is surprised at the first dressing to find so small a granulating surface, the contraction taking place more rapidly than after operations generally.

The chief object of the surgical dressing, or packing of the vagina, is to give support to the newly formed pelvic floor, and to this end the vagina will be lightly packed with iodoform gauze, the removal of which will be subject to the rules for the after treatment of vaginal operations, already formulated.

Contraction and healing are facilitated by dusting the surface every three or four days with *Aristol* and *Bismuth*. As a rule the wound will require no other dressing than this, after the first week. With the *Aristol* and *Bismuth*, packing is unnecessary, a twelve hour douche is quite sufficient to cleanse, and drain the vaginal canal.

The uterus may be removed, *via vaginum*, **by means of the electro-cautery knife.** Ingenious instruments have been devised for this operation, and successful cases have been reported of their use. Two chief claims are advanced by the advocates of this method of operating; the control of hæmorrhage, and the therapeutic action of heat upon the neoplastic cells that lie beyond the line of incision. The hæmostatic action is exerted on the capillaries only, the larger arterial branches requiring ligatures. It is doubtful whether the heat from the cautery knife is sufficiently powerful to destroy the neoplastic cells without at the same time destroying the tissues in which they are situated. Over a clean incision, with ligation of the arteries, I am not convinced that the electro-cautery possesses any special advantages in vaginal hysterectomy.

2. Abdominal Hysterectomy for Malignant Diseases of the Lower Segment of the Uterus, will combine the vaginal and supra-vaginal operations, for the reasons that the cervix can be freed from the vagina more thoroughly through the lower opening, and the pelvis is under better inspection, and its diseased structures can be more certainly reached through the upper opening. Therefore, in the majority of cases in which the uterus is removed for malignant diseases of the cervix, certainly always when the malady is epithelioma, the operation of election will be an **abdomino-vaginal-hysterectomy.**

I am skeptical **regarding the advantages to be gained from the very extensive dissections** that have been made in operating on malignant diseases of the lower segment of the uterus, after the lymphatic glands have become involved, and parimetric infiltration has taken place. There is little reason to believe that the extreme limit of a malignant neoplasm that has passed beyond local development, can with any degree of certainty be reached by possible dissection, and there is the

added danger that the manipulation and trauma that form essential parts of such a technique, may disseminate the neoplastic elements, by forcing them into the tissues, and into the circulating channels. The removal of the broad ligament, and the enucleation of the uterus is entirely practicable, but it is an anatomical impossibility to remove all the lymph channels and glands that are connected with the genital lymphatic system. A few, those that are noticeably enlarged, may be included in the ablation, but the germinal elements are liable to extend beyond a recognizable point, and therefore are almost certain to elude observation.

The vaginal part of an abdominal hysterectomy will constitute the first part of the operation, and as a preliminary every precaution must be taken to close the broken down surface of the os. It may be advisable to suture this at the expense of the mucosa of the vagina, which it is quite justifiable to sacrifice for this object.

By means of the vaginal approach we are able with the advantages of sight and touch, to free the cervix from the vagina, bladder, and rectum, and if desirable, to secure the uterine arteries. This can usually be accomplished with ease through the primary transverse incision that opened the peritoneum, and therefore a longitudinal incision will not always be found necessary for the purpose of gaining additional operative space.

The technique will not differ from that already described, until the ovarian arteries are ligated. The vagina is incised, the anterior and posterior cul-de-sacs opened, the uterine arteries ligated, and the uterus freed from the broad ligaments to a point just beyond the ligation of the arteries. The vagina is then firmly packed with gauze in such a manner as to elevate the uterus into the pelvis.

Without changing the position of the patient, save to remove the thighs from the lithotomy straps, and draw her slightly up on the table, the knees being still flexed, and the feet if necessary resting on a low stool placed at the foot of the table, the abdomen is opened by an incision extending almost the entire distance between the umbilicus and the pubes.

In operations for malignant diseases positive advantages belong to a free incision, that quite outweigh the disadvantages of a possible

post-operative hernia, for I do not regard an additional few inches of opening through the abdominal walls, to in any degree increase shock, or retard recovery. Free access to the diseased structures is necessary, and as far as possible, forcible handling, and manipulation of the parts involved, must be avoided.

The use of the Trendelenburg position, is a matter of individual choice, depending upon the experience and convenience of the operator. The patient should never be placed in this position until the abdomen has been entered, that is, before incising the peritoneum, for the bladder is drawn upwards together with the uterus, and there is danger of wounding this organ, as the uterus is not dislocated until air enters the abdominal cavity. After opening the abdomen, the patient may be placed in the Trendelenburg position, and by so doing gravity removes the intestines from the pelvis, and away from the uterus and the appendages.

While the advantages of the Trendelenburg position of affording a clearer and less obstructed field for manipulation are unquestionable, the unnatural relation that the pelvic organs. are thus made to assume to each other, may at times be reasonably urged against its use. It greatly facilitates deep manipulation, the ligation of arteries, and the like, but in removing the broad ligament, enucleating the ureters, and dissecting out the lymphatic glands, I feel more confident of my operative ground when the patient is prone, in a position that retains the pelvic organs in their natural relation to each other. By packing the abdomen with gauze, I find no difficulty in holding the intestines well away from the field of operation, and I am thus enabled to examine with more accuracy, and without anatomomical distortion, the parts to be removed. The effect of this position upon shock should also be considered.

Careful and time-consuming dissection of the abdominal wall is unnecessary, and is harmful to the degree to which it increases mutilation of the layers of tissue as they are separated from each other. One clean incision in the median line, carried to the linea alba, can be made with a single stroke of the scalpel. Further incisions should be made between hæmostatic forceps,

down to the peritoneum, which is then opened in the same manner, being careful to raise it meanwhile away from the underlying intestines.

To insure accurate coaptation in closing the wound, it is very essential that **the incisions through the several structures should correspond to each other.** Especially is this true of the abdominal fascia, which should be cleanly cut, and in line with the incision through the muscles and the peritoneum.

It has been suggested that a firmer wound is obtained by opening the peritoneum at the side of the incision in the abdominal wall, thus throwing the scar of the serous membrane away from the median line, and bringing uninjured peritoneum against the abdominal wound. There is no reason however to conclude that such a treatment of the peritoneum adds strength to the wall, and its feasibility may be doubted upon the ground that such a lateral incision can be accomplished only at the expense of separating the peritoneum from the abdominal fascia, a procedure that introduces unnecessary trauma, without compensating advantages.

In long abdominal wounds, such as those made for supravaginal hysterectomy, it is convenient to maintain contact between the peritoneum and the integument until the completion of the operation. The abdomen is thus more easily exposed, and the final steps of closure greatly facilitated. To this end *guy-ropes of silkworm gut*, one on each side, may be inserted. These in the hand of an assistant afford valuable aid in exposing the pelvis during the deeper manipulations.

The next consideration will be **the exclusion of the intestines from the field of operation.** It will not serve any useful purpose to make an extended examination of the uterus and adnexa at this time with the object of planning the further steps of the operation. We have previously assured ourselves of the nature of the disease, and ascertained through the vaginal opening that the condition justifies a panhysterectomy, we should therefore proceed without unnecessary delay to prepare the field for work.

For the purpose of keeping the intestines out of the pelvis and away from the uterus, I find nothing more effective than

sterile gauze, wrung out in sterile hot water. This I use in a single piece, the full width of the goods, and of length sufficient to pack against the intestines in such manner as to build a firm wall across the pelvis, extending from one iliac cavity to the other. This step in the operation requires much nicety, but if carefully performed, the artificial diaphragm need not be removed until the operation is completed. Several yards of gauze,—the end introduced should be hemmed to prevent frayed threads from becoming detached, and remaining in the abdomen,—may thus be packed in the pelvis, and being in a continuous strip the intestines cannot escape from between its folds. Separate gauze pads may be used to keep the pelvis free from the intestines, but they do not construct such a retaining wall as can be made with the continuous gauze packing, and even though provided with tapes, may slip in the abdominal cavity, and be overlooked. In case there is an excess of intra-abdominal fat, the gauze may be adjusted while the patient is in the Trendelenburg position, from which she is lowered as soon as the wall is completed, and the operation then proceeded with, in the recumbent position.

The surgeon will now be able to plan that part of the operation which concerns the removal of the uterus, and peri-uterine diseased structures. The uterus will be found raised well out of the pelvis by the packing introduced in the vagina before opening the abdomen. This upward dislocation may be increased by means of a tenaculum making traction on the fundus. The tenaculum should be short, with firm teeth that can be buried deeply in the uterine walls, or a small corkscrew having broad flanges, will sometimes, when the uterus is sufficiently firm, be found useful to draw the organ up. Traction brings into prominence the upper border of the broad ligaments, which are the anatomical guides for ligating the ovarian arteries. By carrying the fundus of the uterus to the opposite side to that which we wish to attack, the artery will be felt as it courses along the broad ligament, and its location pretty accurately fixed for ligation.

The object being to remove the broad ligament at the point of its peritoneal reflection from the side of the pelvis, it will

be found conducive to this end, **to ligate the ovarian artery, as it enters the infundibulo-pelvic ligament.** It can always be felt in this situation, and should be isolated before the ligature is applied, to avoid wide inclusion of the peritoneum. The advantage of this procedure will become apparent when dissecting out the broad ligament, for it will then be found that the arterial stump has retracted, and does not occupy the field of operation. It may seem advisable **to ligate the ovarian artery as it crosses the brim of the pelvis** before entering the infundibulo-pelvic ligament. In this situation the artery is isolated by nicking its peritoneal covering between hæmostatic forceps. After exposure, the ligature,—chromic cat gut,—may be passed on a blunt curved needle. To avoid embarrassing bleeding from the distal end, a provisional ligature should be thrown around the artery, through the folds of the broad ligament near the uterus, and the vessel divided between the two ligatures.

The ovarian vein accompanies the artery, and the two vessels should be included in a common ligature, but in as much as the high point for applying the ligature is in close proximity to the common iliac artery on the right side, and the common iliac vein on the left side, extreme care is necessary during this manipulation to avoid wounding the larger trunks.

The nearness of **the ureter,** which lies to the inner side of the ovarian artery, will also be borne in mind, but the anatomical relation of the iliac vessels, the ovarian vessels, and the ureter, as they pass over the brim of the pelvis, should give rise to no embarrassment, if the peritoneum is split before passing the ligature.

The round ligament is now ligated to secure the *funicular artery* at the brim of the pelvis, and its uterine end clamped.

Up to this point, save in the high ligation of the ovarian arteries, the ureters need not especially concern us, but the course of these ducts must now be demonstrated, either by palpation, or previous catheterization. **The ureters are everywhere extra peritoneal,** and hug the pelvic walls, so that in removing the broad ligament close to its peritoneal reflection, the ureter will be exposed.

Having ascertained the position of the urinary duct, begin-

ning on the left side, **the broad ligament is removed** by carrying an incision through the remaining portion of the ligament, from the point of ligation of the ovarian artery—the infundibulo-pelvic ligament,—to join the opening in the vagina through which the uterine artery was ligated, and which separated the bladder from the lower segment of the uterus. This procedure is repeated on the right side, and the uterus, ovaries, and Fallopian tubes, together with the broad ligaments, severed from their pelvic connections. This excision is conveniently made with blunt curved scissors.

The pelvic cavity should now be thoroughly cleansed, but it will be remembered that this membrane can take care of a consider-able quantity of blood-clot, and even septic material. Also we should bear in mind, that the disturbance of the intestines, and the peritoneum, is in direct ratio to shock, and the forma-tion of post-operative adhesions. If the cavity is irrigated, and this should be done by pouring salt solution from a flask, it is not necessary to remove all the fluid, as the functional activity of the peritoneum is increased by moisture. If it is thought best to sponge the cavity, the utmost care should be exercised, to avoid unnecessary irritation of the peritoneum.

A choice of procedures is open for us. We may conclude the operation by an approximation of the anterior and posterior peritoneal flaps—broad ligament, bladder and rectum,— or we may extend the operation by further dissection, with the ob-ject of removing the pelvic lymphatics, and possibly the in-fected peri-uterine structures.

If the former course is decided upon, and it must be con-fessed that the impossibility of fixing the limits of the neo-plastic infiltration makes rather in its favor, I find the most **accurate coaptation of the peritoneal flaps** to be accomplished by first fixing the bladder and rectum together in the median line, with two or three sutures. From these as a point of de-parture, the peritoneal flaps, remnants of the broad ligaments, can be united with a continuous suture. If this is accurately done, the union is represented by a line extending across the pelvis, which forms a strong wall for the support of the pelvic contents. All ligated vessels remain extra-peritoneal, and no pedicles are within the cavity to be disposed of.

I do not find closing the vault of the vagina to be followed by any special advantages. I now speak of the vaginal walls only, and not of the peritoneum, which has been sutured. Convalescence, if the union is by first intention, will be shortened, but it is almost impossible to avoid slight oozing from the small vessels of the areolar tissue from which the uterus has been enucleated, and if no provision is made for draining, dead spaces remain between the peritoneum and vaginal wall, which delay healing, and may become the source of infection.

The wound in the vault of the vagina heals promptly, and with surprisingly little suppuration if packed lightly with iodoform gauze, and as soon as the patient is able because of the operation *per se*, to leave her bed, the wound is sufficiently healed for her to do so. Any delay there may be in the healing does not retard convalescence, for following an abdominal hysterectomy a patient should always remain in bed at least three weeks, and not be allowed to stand, or walk for one or two weeks longer.

If it is thought advisable to remove the iliac and other pelvic glands and lymphatics, after lifting out the uterus and adnexa, the dissection will be continued by incising the peritoneum in the line of, and over the ureters, taking them as guides for the lymph vessels and glands. Such an opening in the peritoneum will lead to the principal lymphatic glands situated in the region of the bifurcation of the iliac artery.

Catching the peritoneal covering of the ureters with hemostatic forceps, the serous membrane is split up from the point at which the urinary duct crosses the line of the broad ligament, to where it rests upon the brim of the pelvis. By laying bare the ureter—because of its resisting rubber-like feel a safer guide than the iliac artery—and by gentle blunt dissection, the bifurcation of the iliac artery, and its internal and external branches are exposed, and with them a chain of glands that frequently surrounds the arterial branches. In many instances these glands are easily isolated, ligated, and removed, but in others they are deeply imbedded, and quite surround the iliac vessels. Enlargement of the iliac glands is the chief cause of swelling of the feet and legs in the late stages of

uterine epithelioma. They press on the iliac veins, and so interfere with the return blood circulation.

The ureter should be carefully drawn inwards, and away from the iliac vessels, and each gland ligated, and removed separately. If the ureter has been previously catheterized— for this purpose I use a flexible soft rubber catheter with a wire stylet, which affords the necessary definition of the duct, at the same time that it permits its dislocation—there is but slight danger of injury, but **should the ureter be cut, it is better to delay its repair**—the catheter being *in situ* prevents urinary infiltration—until the glands are removed, and the peritoneal wound ready to suture. The same rule is applicable if implantation of the ureter into the bladder, or rectum, becomes necessary.

In case the iliac vein is wounded, it should be sutured at once with fine iron-dyed silk, the line of union being transverse to the axis of the vessel. **If either iliac artery, the external, or internal, is wounded,** it should be treated in a similar manner, and the force of the blood current reduced by elevating the foot of the bed, or by pressure on the common iliac trunk. The possibility of being obliged to ligate either the internal or external iliac arteries, must always be considered, but the condition that leads to such a necessity, deep lymphatic involvement requiring enucleation of the arteries out of the glandular mass, may well be ignored in the operative technique, in view of the disastrous consequences that are liable to follow cutting off the circulation from the parts these arteries supply. If such a development is not recognized until the structures are exposed, it is the part of wisdom to make no further attempt at removal, and to close the peritoneal wound. To proceed would be unjustifiable mutilation.

The anterior branch of the internal iliac artery may be regarded as the key to the circulation of the female pelvis, for not only does the uterine artery have its origin from this trunk, but also the vesicle, vaginal, middle hæmorrhoidal, obturator, internal pudic, and sciatic arteries. In an extended dissection involving the pelvic peritoneum and peri-uterine tissues, branches from any one of these arteries may give rise to troublesome,

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if not dangerous bleeding, that is difficult to control because of the smallness of the vessel, and the intimate anastomosis maintained between all the pelvic vessels. **To control hæmorrhage therefore, and prepare for a practically bloodless operation, it has been proposed as a preliminary step to deep pelvic dissection, to ligate the anterior branch of the internal iliac artery immediately after its origin, or between the giving off of the superior vesicle, and internal pudic arteries.** The procedure has much in its favor, and if decided upon before opening the abdomen, will modify the vaginal technique in respect to the ligation of the uterine arteries. If it is proposed to tie the anterior iliac trunk, it will be unnecessary to ligate its uterine branches, and therefore the vaginal operation will be limited to a free separation of the uterus from the bladder and the rectum, up to the base of broad ligaments. Through the abdomen the broad ligament can be cut out, after locating the ureters, and tying the ovarian arteries, without regard to the uterine arteries.

The following is the **technique for ligating the anterior branch of the internal iliac artery :** After securing the ovarian arteries in the manner already described, the bifurcation of the iliac artery is sought, and its peritoneal covering incised between hæmostatic forceps. By prolonging the opening downwards and outwards parallel to the ureter, the anterior branch is reached, and the point for ligation selected. It is not necessary to include the accompanying vein in the ligature, and it should be avoided. The two trunks are easily separated, and the ligature passed around the artery only.

The peritoneal incision may be prolonged, or continued in any direction that is found advisable for the necessary clearing out of the pelvis. This incision affords free access to the iliac glands, and the preliminary ligature renders their removal almost bloodless.

The integrity of the peritoneum is a matter of the first importance in all abdominal operations, for this great serous membrane protects the underlying structures from the invasion of micro-organisms, and the absorption of ptomains, therefore no detail is unimportant that conduces to restoring peritoneal continuity; and in completing an abdominal hysterectomy the most utmost care should be observed in closing the peritoneal wound.

In this connection the **question of drainage** will naturally be raised. When necessary, and the necessity is always to be deplored, shall we drain through the vagina, only partially closing the floor of the pelvis, or shall we close this canal, and place the drain in the abdominal opening.

Drainage through the vagina is always to be preferred. It is the natural pelvic outlet, and the discharge is assisted by gravity. But if for any reason, the condition of the vagina itself that would render communication with the abdomen unsafe; or the general state of the abdomen, that would suggest better drainage from above, it is thought advisable to close the vagina, and drain through the supra-pubic wound, the fear of post-operative hernia should not deter us from making use of the superior opening.

My experience does not lead me to believe that **drainage through the abdominal wound results in a weaker scar,** or that post-operative hernia is more frequently traceable to such a technique, than when the entire length of the wound is closed. On the contrary when a hernia occurs in an abdominal wound that has been drained, the rupture does not necessarily take place at the seat of drainage, but quite as frequently elsewhere in the line of union. The weak point is not that of drainage, but where the sutures have failed to secure union between the several layers through which the wound is made, the abdominal fascia in particular. The tissue integrity of the abdominal wall is never restored at the point of drainage, and were it not for the cord of dense fibrous tissue that has developed as the sinus heals, and that occupies its position, this would certainly be a weak spot, but the cicatricial tissue constitutes a firm structure that does not yield to intra-abdominal pressure more readily than any other part of the line of union.

It may be considered as fortunate that the conditions requiring drainage after abdominal hysterectomy for malignant diseases of the lower segment of the uterus, are not liable to be present. The operations are clean, save from possible infection from the broken down cervix, and such a source is in a great measure preventible by a preliminary closing of the cervix. Both pelvic and abdominal wounds can usually be safely united

in their entirety. If, however, drainage through the abdominal wound is decided upon, strips of gauze should be carried to each suspected focus, and brought out through the lower angle of the wound. The opening must be large enough to avoid constriction of the gauze, and thus interfere with capillary attraction. The free ends should be left about two inches long, and spread out over the abdomen as rays, from the opening, as a center. In removing them, the injection of *Peroxide of Hydrogen* is conveniently and effectively made in the crater-like depression, from which the strips of gauze radiate.

After having adopted various methods of closing the abdominal wound, I have returned to practically the technique I followed in my early laparotomies. The fundamental propositions that underlie the healing of the abdominal wound, are accurate coaptation of like structures, and the prevention of dead spaces within the tissues ; the attainment of both conditions is facilitated by the method of incising the structures that are to be subsequently united. (*Page 315.*)

I do not feel that redundancy of peritoneum influences in one way or another the integrity and strength of the abdominal cicatrix. If there exists a weak spot in the wall through which the peritoneum can be forced, even though tense, it will not assist in retaining the abdominal viscera within the cavity, but will stretch to almost any extent. The abdominal muscles and fascia will give way without reference to the underneath serous membrane. I therefore do not trim the peritoneal flaps, even though they may seem quite redundant, but unite their well everted edges with a running suture of fine chromic catgut. One or more centimetres of serous surface are thus brought in contact for the entire length of the peritoneal incision.

Before proceeding to suture the separate layers of the abdominal wall with sterile cat gut, I pass heavy silkworm gut supporting sutures through the entire thickness of the wall. A slender, but rather long curved surgeon's needle, armed with iron dyed silkworm gut, is entered just outside of the sheath of the rectus muscle, carried down to the peritoneum, and across its line of union, to emerge outside of the sheath of the other rectus muscle.

By drawing the superficial structures slightly outward, the needle enters the integument somewhat nearer the median line than the point at which it penetrates the underneath fascia. The effect of such an encircling course of the suture is to compress more forcibly the structures within their grasp. These supporting sutures are placed not more than half an inch apart, and are left untied, and hanging, with a hæmostatic forceps to guard each end.

Broad recti muscles will bring these sutures, passing to the outer side of their sheath, a considerable distance from the median line. The cosmetic effect of the wound suffers, but our primary object is to produce a strong abdominal wall; the beautiful wound is quite a secondary consideration, and the advantages of not penetrating the rectus muscles, but of passing outside of them, through less friable and vascular structures, are very considerable, in avoiding hæmatoma that may be caused by wounding small concealed musculo-arterial branches.

When it has been found necessary because of the width of the recti muscles to place the points of introduction and emergence of these sutures far apart, I have tied them over pledgets of iodoform gauze, rather than their ends together. This method is attended with a minimum degree of constriction of the superficial parts, and prevents the sutures from cutting into the integument. With the same object in view, though the pledgets of gauze are not used, I place a strip of several layers of gauze on each side of the wound, between the sutures and the skin.

The object of passing the retention sutures before uniting the separate layers of tissue, is the greater accuracy thus afforded of introducing the needle, which can be done on the finger as a guide. These sutures engage all the layers of the abdomen, with the exception of the peritoneum which they cross, and their introduction through the deeper structures is greatly assisted by sight and feeling, neither of which are available if the sutures are passed beneath fascia and muscles already united.

According to the method of going through the abdominal walls, the technique from this point will differ. **If the rectus**

sheaths have not been opened, it will be sufficient to close the white line of the fascia with a single layer of sutures, but here I prefer interrupted threads. **In case the sheaths of the rectus muscles have been opened,** there is present the complication of dealing with muscles, and the possibility of leaving dead spaces, for the suturing of muscles in a direction transverse to their fibres is not attended with success. The sutures cut out, and cause mutilation, with sufficient hæmorrhage to imperil primary union. The principal of union, that like tissues must be brought in contact with each other, is not to be lost sight of, and we must endeavor to accurately unite the sheaths of the muscles, for upon the success of this depends in great measure the strength of the scar, and the integrity of the post-operative wound.

If there has been any considerable degree of mutilation of the rectus muscle, either while opening the abdomen or during the subsequent manipulations, the best results will be obtained by uniting the sheath, and **draining the muscle with strands of horsehair** carried out through the integument. Serum is usually all that drains from the muscle, and this does not continue beyond twenty-four hours. The horsehair strands may then be removed. By their presence any collection of blood and serum within the sheath of the muscle has been prevented, and we have not thereby in the least delayed healing.

After carefully drying the wound, —it is scarcely necessary to remind the operator that all bleeding points must be secured, either by torsion or ligatures—the supporting sutures are to be tied. The horsehair drain, if used, will be brought out at the lower angle of the wound, and the sutures at this point tied first. In succession each one is tied, but not too tightly, for unless allowance is made for physiological swelling, and œdema, there will follow destructive constriction of the tissues. I tie the silkworm gut sutures at the side of the line of union, and secure the long ends together in a single knot, as in my operation for laceration of the uterine cervix. A continuous suture of fine chromic catgut closes the abdominal wound.

A light dressing, first of iodoform gauze, on which is placed

a fluffy dressing of sterile gauze, with adhesive straps, and an abdominal binder, complete the abdominal dressing.

In the event of drainage of the wound, the dressings are examined at the end of twenty-four hours. The horsehair drain is then withdrawn, and a fresh dressing applied, which will remain undisturbed for a week or ten days.

If the abdominal cavity has been drained with gauze, the dressing will be removed as frequently as it is found soiled.

Much of the, it must be confessed just opprobrium cast upon drainage after abdominal operations, has arisen from **the post-operative management of the drainage tract.** There is no such thing as draining the general abdominal cavity after the forty-eight hours following a laparotomy. Only the area reached by the drainage tube—this term includes all methods of drainage employed,—is drained; adhesive inflammation has before the end of the second day closed the general cavity against communication with the drainage tube. In forty-eight hours the drainage wound is like any other wound that must heal by granulation, and should be treated accordingly.

If drainage is instituted to protect against a dirty peritoneum, of course pus must follow, and to meet this condition antiseptics may be used freely without fear of reaching the abdominal cavity, or of injury to the peritonium. Suppuration here, as elsewhere, will be treated by attacking the granulations, and destroying the micro-organisms. At first daily irrigation of the sinus with *Bichloride of Mercury*, followed with light packing. Later, swabbing with 95 per cent. *Carbolic Acid*, or a 95 per cent. solution *Argyrol*, and gradual shortening of the drainage strip, will usually result in a firm cicatrix. This process, unless there is a ligature, or necrotic tissue as a cause, which will further delay healing, will usually cover from four to six weeks.

It is however a mistake to assume that necessarily a drained abdomen involves suppuration. If it is thought best to provide merely a safety valve for possible exudation from the separation of numerous and extensive adhesions—the necessity for this is overestimated, the peritoneum being able to dispose of an immense quantity of such material,—the operation being aseptic,

there is no reason to believe that of necessity, infection will follow the drainage tract, or that the sinus must suppurate. The exudation of serum in these cases does not continue over forty-eight hours, and should it do so, has no communication with the drainage tract. These cases require no irrigation, and the gauze drainage should early be shortened. It is needless to say, the strictest antiseptic technique should be followed in dressing these cases.

The care of the abdomen after the wound is healed and all dressings discontinued, has an important bearing upon the subsequent strength of its walls. Two propositions, apparently somewhat opposed to each other, are presented. The muscles can only regain their strength and vigor by use, and at the same time the newly united structures are liable to give way if undue strain is placed upon them.

The abdominal walls require support, and for this purpose I use a well-fitting elastic bandage, at first both day and night, for about three months. During this time the muscles should be massaged daily, and the patient encouraged to exercise, and instructed in diaphragmatic breathing, with the object of strengthening the abdominal walls.

The practice of wearing a binder longer than three months, unless justified by some especial requirement, is not advisable, even though the patient may desire to do so. Too long continued artificial support, which prevents the muscles from doing their work, will result in flabbiness of their structures, a condition that may prove impossible to overcome; hence stretching of the entire wall, or of the cicatricial tissue, and post-operative hernia.

THERAPEUTICS.

Aconite: Uterine hæmorrhage, active, much excitability, giddy, cannot sit up, fear of death. Vagina hot and dry. Leucorrhœa copious, tenacious, yellow.

Actea racemosa: Spasm of the broad ligament. Severe pain in in the lower part of the abdomen. Uterine neuralgia. Bearing down, limbs heavy. Uterus very tender. Menses scanty. Apprehensive depression without cause. Distressing pain in back of head and neck. Rheumatic pains. Leucorrhœa with weight in the uterus.

Æsculus hypp.: Cervix uteri inflamed and ulcerated, with great tenderness, heat and throbbing. Chronic leucorrhœa, dark, yellow, sticky; aching in the sacrum, lameness in the back, across the sacro-iliac articulation; cannot walk, the back gives out.

Æthusa cynapium: Lancinating pains in the sexual organs. Pimples on the sexual organs.

Agaricus musc.: Profuse, dark colored leucorrhœa. Severe bearing down. Internal and external itching.

Agnus castus: Inflammation of the uterus, transparent leucorrhœa, copious, relaxation of the uterus and vagina. Depression, cannot be roused to the necessity of exertion.

Aletris farinosa: Atony of the sexual organs, from which follows prolapsus; menorrhagia—black coagulated blood,—great physical and mental lassitude.

Aloes: Fullness in the uterine region, hæmorrhage at the climacteric. Bloody leucorrhœa, preceded by colic.

Alumen: Induration of the uterus. Scirrhus that has broken down. Weight in the uterus. Granulations in the vagina. Leucorrhœa. Severe pain in the right ovary and groin. Emaciation, yellow complexion. Anæmia.

Ambra gris.: Discharge of blood between the periods; any accident, a difficult stool, or walking, will bring on a slight flow. Lying down aggravates all the uterine symptoms. Profuse mucous leucorrhœa aggravated at night.

Ammonium brom.: Uterine hæmorrhage from ovarian irritation. Constant pain in the left ovary.

Ammonium carb.: Watery burning leucorrhœa. Menstrual blood acrid, making the thighs sore.

Ammonium mur.: Constant brown, slimy, painless leucorrhœa, increasing after each urination. Hypertrophy of the uterus. Strained feeling in the groins, forcing the patient to walk bent over.

Amylenum nit.: During the menses severe left-sided headache, beginning in the morning, most severe at noon, decreasing towards evening. Chronic blushing during the climacteric.

Anatherum mur.: Hard tumor in the cervix uteri. Lightning pain in uterus.

Angustura: Sensition as if the uterus was falling over.

Antimonium c.: Acrid, watery leucorrhœa containing lumps. Tenderness of the ovaries following suppression of the menses from taking a bath.

Apis: A variety of pains in the ovaries, especially the right; the pains are stinging, with sensitiveness. All the ovarian pains are aggravated by coitus. Swelling of the ovaries. Engorgement and ulceration of the uterine cervix. Leucorrhœa with eruptive diseases. Leucorrhœa acrid, profuse, green. Strained feeling across the hypogastrium. Young girls at puberty, hysterical, awkward.

Argentum nit.: Neck of the uterus spongy, deeply corroded; purulent, ichorous, bloody discharge, having an unbearable stench. Scirrhus. Pain in the left ovary as if it was rapidly increasing in size. Soreness of the entire abdomen, aggravated by riding in a carriage.

Argentum nit.: Pain in the right ovary, radiating to the sacrum and thigh. Bleeding follows coitus, which is very painful. Pain like sticks or slivers about the uterus. Uterus soft with granulated cervix. Ulcers bleed readily. Bloody leucorrhœa. Corroding, yellow.

Arnica m.: Bruised pain in the groin following an injury, cannot walk erect. Ulceration of the cervix with tendency to bleed. Bloody discharge between the menstrual periods. Discharge of blood following coitus.

Arsenicum : Burning in the right ovary, extending to the thigh. Restlessness, constant moving of the feet. Nodular swelling of the uterus; os swollen, hard and sensitive, scirrhus. Polypus of the uterine cervix. Thin, watery, offensive discharge in the place of the menses. Ulcers on the os, with dark, watery, offensive, corroding discharge. Edges of the ulcer raised and callous.

Asafœtida : Ulceration of the cervix, sensitive, with offensive discharge. Leucorrhœa profuse, green, thin.

Atropinum sulph. : Severe ovarian neuralgia.

Aurum : Uterus congested and indurated, its weight causing prolapsus. Thick white leucorrhœa; great despondency, with suicidal inclination. Sterility.

Aurum mur. nat. : Uterus indurated at the same time that the os is ulcerated. Corroding leucorrhœa. Syphilis.

Baryta carb. : Bloody mucus lucorrhœa with swelling of the glands. Weakness and sensation of bodily heaviness.

Belladonna : Affections of the right ovary. Pain in the pelvis that begins, and ceases suddenly. Fullness and bearing down, aggravated by lying down. Spasmodic contraction of the cervix; vagina and portio hot, dry, and glazy. Dysmenorrhœa with very severe bearing down pains. Women of full habit. Profuse bright red blood. All the mucous membranes bright red and congested. Throbbing of the carotids. Pain in the back as if it would break.

Benzoic acid : Prolapus of the uterus, with very fetid urine. This condition of the urine is quite characteristic, and its occurrence always suggests this remedy.

Berberis : Coitus painful. Menstruation resembles the washing of meat, fetid lumps, brown, filthy slime. Pain in the kidneys, running down the legs. Sticking pain in the bladder, and the urethra, which continues after urinating.

Borax : Uterus enlarged. Leucorrhœa like the white of an egg, glutinous, with a sensation as if warm water was flowing from the vagina. Profuse discharge relieves the other symptoms of the genital organs.

Bovista : Frequent flow of blood between the menses, most profuse in the morning. Diarrhœa before and during

menstruation. Leucorrhœa leaves green spots on the linen. Soreness between the labia, and thighs. Irritation of the skin.

Bromium: Continued dull pain in the left ovary. Menses too early and profuse. Emission of flatus from the vagina. Swelling and induration of glands. Especially suited to persons of light complexion.

Bryonia: Severe pain in the right ovary. All the symptoms are increased by the least motion. Vicarious menstruation, bleeding from the ears and nose. Menstruation suppressed, or blood dark red, with pain in the back.

Bufonis: Burning heat and stitches in the ovaries. Ulceration of the cervix, with sharp dagger-like pains. Offensive purulent leucorrhœa. Spasms during coitus.

Cainca: Suppressed menstruation; occupies a first position among emmenagogues.

Caladium: Violent itching of the external genitals. Mucus discharge, eruption of pimples on the labia.

Calcarea ost.: Fibro-myoma of the uterus. Ulceration of the cervix. Uterine polypi. Menstruation profuse, and too early, the least excitement causing a return of the flow. Milk-like leucorrhœa. Discharge of bloody water after the climacteric. Aversion to the open air. Adapted to persons with pale, fair complexion.

Calcarea phos.: Uterine polypus. Cervix swollen, red and painful. Glands (*ovula Nabothi*) feel like shot beneath the mucous membrane. Leucorrhœa like the white of egg, sweetish odor. Nymphomania. All the erectile structures in a state of intense excitement.

Calendula: Ulceration of the uterine cervix, profuse watery discharge.

Cannabis sat.: Infantile leucorrhœa (gonorrhœa?). Cutting during urination.

Cantharides: Inflammation of the ovaries following gonorrhœa. Swelling of the cervix, burning smarting of the vagina, also when urinating. Intense irritation of the vulva—vaginitis. Hypersensitiveness of all the genital organs. The leucorrhœa is attended with intense sexual excitement.

Carbo an.: Induration of the uterus, with discharge of slimy, discolored blood. Ulceration of the os, with foul discharge, and labor-like pain in the sacrum. The destruction of tissue is superficial, and sluggish.

Carbo veg.: Uterine cancer, with paroxysmal burning. Erectile tumors, and red sore places on the pudenda. Leucorrhœa corroding, and thin, spasmodic flow. At the time of menstruation violent itching of a chronic eruption. The os is open, with hernia of the cervical mucosa. Menstrual blood has a very strong odor.

Carbolic acid: Ulceration of the uterine cervix, with fetid, green, acrid leucorrhœa. Pain in the left ovary. Excessive accumulation of flatulence, with belching, and fullness in the throat.

Carduus mar.: Chronic uterine hæmorrhage, with derangement of the portal system.

Caulophyllum tha.: Congestion of the uterus. Leucorrhœa with intermittent pains; these pains are characteristic of this drug.

Cedron: After coitus, irregular, and uncontrollable movements of the left leg and arm; grimaces, and facial contractions. Respiration much embarrassed. Menstrual epilepsy.

Cicuta vir.: Coccyodynia, especially aggravated during menstruation.

Cina: Uterine hæmorrhage before puberty. Frequent urging to urinate during the day, with copious discharge.

Cinchona off.: Ovaritis following sexual excesses. Congestion of the uterus. Painful induration of the vagina. Under Cinchona all the parts are extremely sensitive to touch. Especially suitable to women at the climacteric.

Cinnamomum: Any false step, or a strain, is followed by hæmorrhage of bright red blood.

Clematus erecta: Broken down scirrhus of the cervix, corrosive leucorrhœa, and lancinating pains running upwards.

Coca: Menses flow in gushes, awakening from sleep.

Cocculus: During menstruation, which is scanty, the characteristic symptom is a "weak back." The pain is of such a nature, that the patient feels as if she would be paralyzed. There is also vertigo, with a sensation of intoxication.

Coffea cruda: Metrorrhagia, large black lumps. Leucorrhœa like milk. The predominating concomitant is great sensitiveness of the genitals, and intense nervous excitability.

Collinsonia can.: Uterine displacement. Congestion of the cervix, and dysmenorrhœa dependent upon, and associated with obstruction to the portal circulation, hence there will always be found as concomitants, constipation, and hæmorrhoids.

Colocynthis: Spasmodic—colic—pains in the ovaries, causing the patient to bend double. The characteristic pains will dominate all the conditions in which this remedy is indicated.

Conium mac.: The tissue characteristic of this remedy is induration, hardness. Induration of the cervix, with sharp pains. The induration is at first confined to the cervical glands, which are felt as stony hard bodies. Ulceration of the cervix, the edges and base of the ulcer being hard and dense. Burning, stinging in the cervix. The discharge is brown, and fetid. The mental condition is one that would attend ungratified sexual desire.

Crocus sat.: Dysmennorrhœa, dark, stringy blood.

Crotalus hor.: Hæmorrhagic diathesis. Cancer uteri, cauliflower excrescences, tendency to hæmorrhage. Vicarious menstruation, passive hæmorrhage, caused by deficiency in the vascular walls. Depressed system, septic intoxication.

Cubeba: Acrid, greenish leucorrhœa in children.

Curara: Funnel-shaped ulcer of the cervix uteri, the surrounding tissues of the portio-vaginalis are a dark purple color. Discharge fetid, and corroding. Tissues of the inguinal region indurated and very sensitive. Vaginal corrugations swollen and inflamed.

Cyclamen eur.: Leucorrhœa in blonde, leucophlegmatic women. Torpidity of mind and body; better when roused and forced to exercise. Very heavy and languid in the morning.

Dioscorea vill.: Dysmenorhœa, pains suddenly fly to distant parts.

Dulcamara: An eruption appears on the body before menstruation.

Elaps cor.: Sudden discharge of a quantity of black blood from the uterus. Sensation as if something had burst in the uterus, followed by a continuous stream of venous blood.

Eucalyptus glob.: Vascular tumor of the urethra—carbuncle. Acrid fetid leucorrhœa.

Ferrum: Metrorrhagia with a very red face. Sensation as if all the blood in the body was rushing to the face and head.

Fluoric acid: Obstinate ulceration of the cervix. The ulcers have red borders, and are the seat of sharp, darting pains; congestion of the sexual organs.

Gelsemium s.: Uterus antiflexed, feels as if being squeezed by a hand. Congestion of the uterus, with spasmodic pains. Frontal headache, and dim vision. Dysmenorrhœa, deep red face. Lameness and stiffness of the neck, spreading out towards the shoulders. Passive congestion of the pelvic organs and structures.

Graphites: Affects especially the left ovary, which is hard, and painful when touched. Cauliflower excrescences, cancer uteri, severe lancinating, sticking pains, running down the lower extremities. Cervix hard, discharge of black, lumpy, fetid blood. Leucorrhœa in gushes at night. The discharges are excoriating, and cause cracking of the skin, and mucous membranes with which they come in contact. Old cicatrices, as a repaired perineum, become irritated and break down. Adapted to women who are inclined to obesity.

Hamamelis v.: Congestion and neuralgia of the ovaries, especially the right gland. Chronic metritis, bloody leucorrhœa with great tenderness of the vagina. Venous congestion, passive hæmorrhage. Vicarious menstruation, the parts from which the hæmorrhage takes place feeling sore and bruised.

Helonious dio.: The patient is conscious of her womb, which is sore and heavy. There is profound melancholy. The uterus is felt to move in the pelvis. Ulceration of the cervix, constant dark discharge, having a foul odor. The least exertion causes flooding. Menorrhagia from uterine atony. Leucorrhœa in old women. Prolapsus of the uterus.

Hepar sulph.: Uterus enlarged, ovaries congested. Ulceration of the cervix, discharging bloody pus which smells like old cheese; edges of the ulcer sensitive. Leucorrhœa purulent, white, yellowish, causing smarting of the vulva. Lymphatic constitution, muscles soft and flabby.

Hydrastis can.: Superficial ulceration of the uterine cervix, with tough stringy mucus hanging from the os. Cervix eroded, swollen, indurated. Digestive organs sympathize with the uterine diseases. Subinvolution of the uterus. Endometritis. Tenacious, viscid leucorrhœa, thick, yellow, ropy.

Hydrocotyle Asiatica: The uterine cervix and os are very red. The anterior lip is occupied with a fungus ulcer. Granular erosion of the entire cervix, prolapsus of the uterus, with profuse leucorrhœa. Insupportable itching of the vagina.

Hyoscyamus nig.: Menorrhagia of bright red blood. Intense nervous excitement. Lacivious mania. Suspicious, fears she will be poisoned.

Iodum: Atrophy of the ovaries. Right ovary especially affected. Pain in the right ovary passing down the broad ligament to the uterus. Cervix swollen, hard and indurated. Degeneration of the cervix, with corroding leucorrhœa rendering the thighs sore. All the processes of this remedy are indolent. It is especially suitable for persons having dark hair and eyes. There is gradual progressive wasting of all the tissues. The glands, especially those of the mesentery, are enlarged.

Kali ars.: Cauliflower excrescences of the os uteri, with flying pains, pressure below the pubis, and stinking discharge.

Kali bich.: Subinvolution of the uterus. Pruritis. Leucorrhœa yellow, ropy, can be drawn in long strings, and stiffens the linen. Tenacious mucus accumulates in the vagina, and is difficult to remove. Weakness in the small of the back. All the conditions are aggravated in hot weather. Suited to fair, light haired persons, who suffer from catarrh.

Kali brom.: Subinvolution of the uterus. Uterine fibroids. Ovarian neuralgia caused by ungratified sexual desire.

Menorrhagia reflex from ovarian irritation caused by strong sexual desire. Epilepsy near menstruation. Adapted to large persons inclined to obesity.

Kali carb.: Chronic metritis. Profuse and long continued menstruation. Adapted to fleshy, aged persons.

Kali jod.: Fibroid tumors of the uterus. Subinvolution, with predispositon to hæmorrhage. Constant leucorrhœa, thin, ichorous, corrosive. *Kali jod.* will rarely be indicated in the absence of infiltration of the tissues affected, and an excoriating discharge.

Kreosotum: Ulceration of the uterine cervix. The base of the ulcer is spongy, secreting a foul pus. Hard lumps on the cervix. Menorrhagia following coitus. Menorrhagia long continued, blood thin, and watery, offensive. The ulcer—epithelioma,—is very sensitive, and bleeds easily; discharge thin, and excoriating.

Lachesis: Sharp throbbing in the ovaries, especially the left. Inability to lie on ,the right side because of a sensation as if something was rolling over to that side. All the pains are relieved by a discharge from the uterus. Prolonged and profuse menorrhagia, with uterine and ovarian tumors. Pressure, or constriction, aggravates all the symptoms. Uterine cancer at the climateric, the pains increase gradually, and are not relieved until there is a flow of blood from the uterus. Uterine cervix very much congested. With many of the pelvic conditions the face is congested, a deep red color.

Lactic acid: Aching pain in the right ovary. Leucorrhœa stains the linen as yellow as saffron. There is very profuse sweating of the feet, not offensive.

Ledum pal.: Uterine polypus, constant flow of blood.

Lilium tig.: Subinvolution of the uterus, the uterus does not regain its normal size after parturition. It is heavy, and is felt to move out of place by the patient when she walks. The os is wedged against the sacrum, causing a constant desire for stool; the fundus lies on the bladder, causing frequent urinating. Neuralgic pains in the pelvis, which is very sensitive to touch. Thin, brown, excoriating leucor-

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rhœa.   Sensation as if the uterus fell from the right to
the left side of the pelvis.   Marked sexual erethism; must
be mentally diverted to relieve her sufferings.

Lobelia inf.: Violent pain in the sacrum.

Lycopodium : Pain running from the right to the left ovary.
Leucorrhœa in gushes.   Dryness of the vagina preventing
coitus.   Discharge of flatus from the vagina.

Lycopus vir.: Uterine cervix engorged and swollen, vagina hot.
There will be an accompanying cardiac irritability.

Lyssin : Uterus very sensitive, erosion of the os with swelling
of the portio-vaginalis.   Pain extending from the uterus
to the right breast. String of bloody mucus hanging from
the otherwise normal os.   Bleeding from the rectum dur-
ing menstruation.

Magnesium carb.: Menstruation, which is dark, almost pitch-
like, more profuse at night, quite disappearing during the
day. Leucorrhœa, white, acrid, preceded by colic. There
is a general aggravation from 2 to 3 A. M. Especially
adapted to persons of an irritable disposition.

Magnesium mur.: Stony induration of the cervix. Great excite-
ment at each menstruation. Menorrhagia, black, clotted,
at night, in old maids. Dry spasmodic cough at night,
tickling in the throat.

Magnesium phos.: Ovarian neuralgia, lightning pain. Right
ovary.

Marum ver.: Smooth, pedunculated pear-shaped fibroma of
the vagina.   Polypi of all kinds.

Mercurius : Bleeding excrescences on the os uteri. Deep ulcers
on the cervix, ragged edges, muco-purulent discharge.
Syphilis.   Inguinal glands swollen. Vagina swollen and
excoriated, parts raw. Repeated miscarriages. Sweating
affords no relief.

Mercurius corr.: Erosion of the uterine cervix. Pale yellow,
sweetish smelling leucorrhœa. Intense irritation of all
the mucous membranes.

Mercurius dulc.: Broad, moist, burning condylomata around the
external genitals, perineum, and anus. The discharge
posesses an extremely offensive odor.

Mercurius jod. fla.: Yellow leucorrhœa, particularly in young girls.

Mezereum: Erosion of the cervix, bleeding easily; smarting, burning, prickling sensation. The discharge is liable to form a soft crust that covers the ulcer.

Murex pur.: Cervix enlarged, and violet colored. Erosions on the anterior aspect of the cervix, that bleed upon the slightest touch. Beating and throbbing in the uterus. The mental state is one of the most intense sexual excitement.

Natrum carb.: Passive congestion of the uterus, strong pulsation during, and following coitus, due to excessive sexual excitement. Pressure as if the uterus would protrude from the vulva.

Natrum mur.: Portio-vaginalis inflamed, mucosa glassy. Utero-sacral ligaments infiltrated, sensitive to pressure, standing out as tense bands in the posterior cul-de-sac.

Natrum phos.: Sour-smelling leucorrhœa.

Nitric acid: Excrescences on the portio-vaginalis. Cancer uteri. Coffee-ground, offensive discharge at the climacteric. Sudden gush of muddy water, very offensive. Exuberant granulations occupy the ulcerated surfaces; they bleed readily. Bad effects of mercury. The characteristic pains are as of a splinter sticking in the parts.

Nux .vom.: Chronic metritis, bearing down of the uterus towards the sacrum, constant urging to urinate, constipation. Hardness and swelling of the cervix. Adapted to bilious temperaments, and persons who are accustomed to rich living.

Palladium: Right ovary swollen, indurated, and sore to pressure. All pains are forgotten when in society.

Phosphoric acid: Condylomata rough and dry, that fill the vagina. Fungus hæmatodes. Cauliflower cancers bleeding profusely, because of profound alteration in the blood—leucocytosis. Excessive sexual erethism, reaching nymphomania.

Phytolacca: Ulceration of the cervix uteri, the ulcer looks as if it had been punched out. Scirrhus. Leucorrhœa thick, tenacious from swollen Nabothian glands.

Platinum: Pain in the ovaries, profuse dark menstruation. Nymphomania, excited by the slightest touch. The mental characteristics will dominate conditions calling for *Platinum*. Arrogance, overestimation of oneself, and *hauteur*, are present in an extraordinary degree. The patient looks with contempt upon everyone.

Podophyllum pel.: Pain in the right ovary following the anterior crural nerve. Constipation, torpidity of the liver.

Pulsatilla: Congestion of the ovaries after getting the feet wet. Menstruation dark purple, aggravated during the pain, and when lying down. Flow fitful in character. Epistaxis in the place of the menses. Uterine pain cramping and colicky, the actual bearing down pains are not as well marked. Suitable to irresolute, yielding, lachrymose women, or those who are peevish, nothing pleases them.

Sabina: Inflammation of the ovaries. The os is wide open. Bright red clotted blood, increasing with every motion. Condylomata that itch and burn.

Sanguinaria: Ulceration of the cervix, the ulcer has a hard indurated border, and a fetid corrosive discharge. Uterine polypi. Profuse, corrosive, fetid leucorrhœa at the climacteric. Vaginal mucous membrane relaxed and congested. Headache, pain beginning in the occiput spreading forward, and settling over the right eye; sensitive to noise and light. Rush of blood to the head, which is liable to induce nausea, and vomiting.

Secale cor.: Right ovary congested, very sensitive to touch. Uterine hæmorrhage, flow passive, dark fluid blood, the coagulating quality being lessened.

Senecio: Leucorrhœa preceded by headache, sleeplessness, and irritable bladder in little girls. Amenorrhœa.

Sepia: Uterus swollen, engorged with blood, throbbing, sensitive to touch. Ovaries congested, dull heavy throbbing pain. Induration of the cervix. Ulceration of the cervix, sticking pains running upwards. Prolapsus of the uterus. Dryness of the vagina so marked as to be felt when walking. Leucorrhœa yellow, with burning, especially profuse after urinating. The portal circulation is generally slug-

gish. There is great sadness, but unlike that of Pulsatilla, there is irritability; the patient must not be opposed. There is throbbing pain over one eye (it may be either). The pains are deep. There is great intolerance of light and noise. Suited to persons of dark hair, rigid fiber, but of a mild disposition.

Silicea: Induration of the cervix. Ulceration of the cervix, the excavations are deep, with irregular edges. Periuterine cellulitis. Areolar hyperplasia. Discharge of a quantity of water in the place of the menses. Occipital headache, the pain spreading to the vertex, which is relieved by warmth.

Tarantular: Engorgement of the cervix, with ulceration, the granulations of which extend to the vagina. Vaginal mucosa highly inflamed. Chronic vaginitis. Deep ulcers involving the posterior lip of the cervix. Smarting leucorrhœa, with uneasiness in the coccyx. Terrible pruritus from irritation of the terminal nerves. Nervous, hysterical persons.

Terebinthina: Fibroid enlargement of the uterus, bloody, offensive leucorrhœa. Passive hæmorrhage. Ecchymotic spots appear frequently on the body, without apparent cause.

Thuja: Warts and condylomata. Left ovary inflamed and sensitive; squeezing pains. Erosion of the cervix. Polypi. Cauliflower excrescences of the os uteri. The discharge is not as profuse as the neoplastic development indicates.

Ustilago: Intermittent neuralgia of the left ovary. Constant pain in the ovary passing down the leg. Hypertrophy of uterus, os soft, spongy, and widely dilated. Cervix bleeds easily when touched. Oozing of dark blood from the inflamed os. Blood dark, and very thin. The vascular walls do not contract, but remain wide open. Adapted to lymphatic constitutions, clear white skin.

Veratrum vir.: Acute metritis and ovaritis. Pelvic cellulitis. Congestion of the pelvic organs, tenderness of the uterus. Pulse hard, rapid, and irregular. Septicæmia.

Vespa: Cervix purple, dark blood oozing from the mucous

membrane. Irritable ulceration of the cervix extending into the cervical canal.

Virburnum op.: Sudden, excruciating colicky pain through the uterus and lower abdomen, preceding menstruation. Irritable ovaries, with dysmenorrhœa.

Vinca minor : Passive menorrhagia with uterine fibroids. Passive hæmorrhage in women who have passed their climacteric.

Xanthoxylon : Dysmenorrhœa, agonizing pain spreading along the genito-crural nerve. Face flushed. Severe pain in the loins and down the thighs. Women of spare habit, and delicate nervous temperament.

Zincum : Ovarian neuralgia, especially the left ovary, in women who have overworked, business women. Ulceration of the cervix, the ulcers are not sensitive; bloody acrid discharge. Menstrual flow relieves all the nervous symptoms.

REPERTORY.

Conditions and Symptoms of the Uterine Cervix.

Atony of the: *Squilla.*
Broad ligament, spasm of the: *Actia v.*
Burning in the: *Arsenicum.*
Blue, hard, everted lips: *Hamamélis.*
Contraction, spasmodic: *Belladonna.*
Cancer of, at the climacteric, in old maids: *Calc. ost.*
Cancer with flooding: *Calendula.*
Cancer of the: *Carbo veg.*
Cancer, ulcerated: *Phytolacca.*
Cancer, indurated; bloody discharge between the menstrual
    periods: *Silicea.*
Cancer, corrosive leucorrhœa, faintness at stomach at 11 A. M.:
    Sulphur.
Cancer, profuse hæmorrhage: *Thlaspi bur. pur.*
Cancer at the climacteric period, relieved by the flow of blood:
    Lachesis.
Cauliflower excrescences, darting pain, very fetid discharge: *Kali
    ars.*
Cauliflower excrescence, severe lancinating pain: *Graphites.*
Cauliflower excrescence, bleeding from the slighest touch: *Phos-
    phorus.*
Cauliflower excrescence, excessive sensitivess of vagina: *Thuja.*
Cervicitis : *Lilium tig.*
Degeneration of the cervix, with great emaciation: *Iodum.*
Dry and swollen: *Sepia.*
Engorged, dark and red: *Mitchella rep.*
Engorged, and swollen: *Lycopus vir.*
Engorgement, granulations extending into the vagina: *Tarantula.*
Erosion and engorgement: *Apis.*
Erosion, chronic: *Kreosotum.*
Eroded, indurated, hot watery discharge: *Hydrastis.*

Erosion, leucorrhœa, heavy pungent odor, excessive sensitive-
ness of the vagina: *Thuja.*

Erosion, with profuse excoriating leucorrhœa: *Alumian.*

Excrescences, bleeding: *Merc. v.*

Excrescences, profuse brown offensive discharge: *Nitric acid.*

Fungoid growths, hæmorrhage dark and watery: *Crotalus h.*

Fibroid tumor, polypus, constant bleeding: *Ledum p.*

Granulations bleeding easily: *Argent. nit.*

Granulations, fungoid of anterior lip: *Hydroctovle.*

Glands, enlargement of Nabothin: *Calc. phos.*

Hardness and swelling: *Nux vom.*

Hard, swelling, discharge between the menstrual periods:
Robinia.

Hypertrophy, soft and spongy: *Ustilago.*

Inflammation, tenderness and throbbing: *Æsculus h.*

Induration : *Alumen.*

Induration, painful, with light yellow leucorrhœa, aggravated in
the morning: *Aurum met.*

Induration : *Mag. mur.*

Induration with bearing down, and pain in the back: *Natrum
carb.*

Induration with local heat: *Camphora.*

Induration : *Carbo veg.*

Induration, acrid leucorrhœa: *Conium m.*

Induration and ulceration: *Carbolic acid.*

Induration, flow of blood from slight straining: *Podophyllum.*

Induration : *Sepia.*

Lumps, hard, in the cervix: *Kreosotum.*

Nodules, hard and swollen: *Graphites.*

Os uteri wide upen: *Secale c.*

Os uteri open: *Ustilago.*

Polypus : *Arsenicum.*

Polypi : *Calcarea ost.*

Polypoid growths; irritable, painful: *Kreosotum.*

Polypus, smooth: *Marum vir.*

Polypus, hæmorrhage in clots: *Platinum.*

Polypus : *Sanguinaria.*

Polypus, with pain in groin: *Thuja.*

Purple cervix, with ichorous discharge: *Curara.*

Purple from congestion: *Vespa.*

Pains, lancination: *Graphites.*

Pains, sticking: *Sepia.*

Redness, with profuse leucorrhœa: *Hydrocotyle.*

Redness, with strings of bloody mucus hanging from the os: *Lyssin.*

Spongy, corrosive, purulent ichorous discharge, burning in the groin: *Argentum nit.*

Swollen and hard, bruised, shooting pain: *Aurum met.*

Stitches: *Calcarea ost.*

Swollen, red and purple: *Calcarea phos.*

Swollen, burning in the bladder, sterile women: *Cantharis.*

Swollen, hard and indurated, corroding leucorrhœa: *Iodum.*

Swollen, cervix gray color: *Natrum mur.*

Swollen and hot, watery foul smelling leucorrhœa: *Sarracenia pur.*

Swollen, bleeding easily when touched: *Ustilago.*

Soreness of the cervix, pain running up in the abdomen, profuse leucorrhœa, excessive sexual desire: *Murex pur.*

Scirrhus, throbbing, lancinating, burning: *Arsenicum.*

Scirrhus, severe cutting in the abdomen: *Magnesium mur.*

Tumor in the wall of the cervix; debility and prostration: *Ananth. mur.*

Tuberculosis: *Carbolic acid.*

Tenderness: *Hydrastis Can.*

Ulcerated: *Arbotanum.*

Ulcerated, with stitches: *Anantherum.*

Ulcers, not sensitive: *Zincum.*

Ulcers, irritable, extending into the cervical canal, pain invading the inguinal region: *Vespa.*

Ulceration: *Tarantula.*

Ulceration, leucorrhœa profuse, transparent: *Alumen.*

Ulceration, obstinate: *Carbolic acid.*

Ulceration, burning pain, offensive discharge: *Bufones.*

Ulceration, foul discharge, increased by the least exertion: *Helonias d.*

Ulceration, funnel-shaped excavation, purple, foul discharge *Curara.*

Ulceration, superficial: *Carbo a., Hydrastus.*
Ulceration: *Calendula.*
Ulceration, bleeding readily : *Arnica.*
Ulceration, fetid leucorrhœa, irritation of the rectum: *Leptandria.*
Ulceration, sharp darting pains, excoriating leucorrhœa: *Fluoric acid.*
Ulceration, corroding leucorrhœa: *Aur. mur. nat.*
Ulceration, burning, smarting discharge: *Mezereum.*
Ulceration, foul discharge: *Carbo veg.*
Ulceration, profuse bleeding, fetid discharge: *Phos. acid.*
Ulceration, fetid corrosive leucorrhœa: *Sanguinaria.*
Ulceration, the cervix feels as if burnt: *Secale cor.*
Ulceration, bloody, acrid discharge: *Zincum.*
Utero-sacral ligaments, infiltrated: *Natr. m.*

PUDENDAL DISCHARGES, AND ACCOMPANYING CONDITIONS.

Acrid, corroding, burning: *Arsenicum.*
Acrid, very penetrating odor: *Berberis.*
Acrid, with indurated cervix: *Conium.*
Acrid, green; large painful swelling of the labia: *Apis.*
Acrid, bloody, biting the parts: *Kreosotum.*
Acrid, cutting tearing in the bladder, and urethra: *Berberis.*
Brown, fetid: *Conium. m., Lilium tig.*
Burning and smarting: *Tarantula.*
Bloody mucus, preceded by colic, labor pains in the loins: *Aloe soc.*
Bloody water, after the climacteric: *Calc. ost.*
Black blood, masses of, with eruptive diseases: *Apis, Kreosotum.*
Black blood, sudden discharge of: *Elaps. cor.*
Coition, bleeding following: *Argent n., Arnica, Kreosotum.*
Corroding : *Aur. mur. nat.*
Corrosive, with broken down scirrhus: *Curara., Clematis e.*
Children, leucorrhœa with sticking pains in the mons veneris: *Viola tric.*
Children, young, yellow leucorrhœa: *Merc. jod. flav.*
Children, young, profuse leucorrhœa, very weakening: *Caulophyllum, Cubeba, Merc. jod. f.*

Climacteric, leucorrhœa like coffee grounds, offensive: *Nitric a.*

Climacteric, putrid leucorrhœa, ulceration of the cervix: *Kreosotum.*

Dark, profuse blood, with itching in the vagina: *Amanita.*

Dark blood, and very thin: *Ustilago.*, *Mag. carb.*

Egg, discharge like the white of, sensation as if warm water were flowing over the parts: *Borax.*

Egg, like the white of, with severe pain in the back: *Hydrastus.*

Egg, like the white of: *Calc. phos.*

Excoriating, acrid: *Ammonium mur.*, *Iodum.*

Excoriating, very profuse: *Alumina.*

Excoriating the parts over which the discharge flows: *Kali. jod.*, *Kreosotum.*

Fetid, acrid: *Carbolic a.*, *Graphites*, *Helonious d.*

Fetid, cauliflower excrescence from the os: *Kali ars.*

Foul smelling, ichorous discharge, with ulceration of the os, and exuberant granulations: *Argentum nit.*

Glands, swelling of the inguinal, with sour smelling leucorrhœa: *Natrum phos.*

Gushes, acrid leucorrhœa, coming in: *Silicea.*

Greenish, profuse, offensive: *Asafœtida.*

Hot water, leucorrhœa like, with eroded cervix: *Hydrastis.*

Hot, the leucorrhœa seems to be very: *Borax.*

Intermittent, corrosive: *Carbo veg.*

Irregular bleeding in persons past the climacteric: *Kreosotum.*

Leucorrhœa at hight: *Graphites*, *Amb. g.*

Leucorrhœa, infantile: *Cann. sat.*

Lumpy, brown leucorrhœa follows each urination, crumbling stool: *Ammonium mur.*

Meat, like the washing of: *Cocculus.*

Meat, like the washing of; acrid: *Kali jod.*

Milk, like: *Angustura.*

Milky, per saltum; aggravated before a full moon: *Lycopodium.*

Metorrhagia with colic: *Thlaspa bur. past.*

Metorrhagia, blood dark and very thin: *Ustilago.*

Mucous, pain in the small of the back as if bruised: *Kali nit.*

Menstrual blood, strong odor: *Carbo v.*

Menstrual periods, bleeding between: *Arnica.*

Menstruation, leading from the rectum during: *Lyssin.*

Menstruation, coccyodynia aggravated during: *Cicuta v.*

Nymphomania, bluish white leucorrhœa, aggravated at night: *Ambra g.*

Offensive, thick white in the place of the menses: *Arsenicum.*

Purulent, mucous, ulcerated cervix: *Mezereum.*

Purulent, white, yellow, fetid: *Hepar sulph.*

Purulent, offensive, cervical ulcer: *Bufones.*

Pururitis vagina, profuse irritating leucorrhœa: *Alumina.*

Puberty, bloody discharge before: *Cina.*

Pus-like, offensive: *Hydrastis.*

Ropy, yellow, stiffens linen, weakness in the small of the back: *Kali bich.*

Smell like old cheese: *Hepar s.*

Stains brown, thin, acrid: *Lilium tig.*

Scrofulous women : *Iodum.*

Stringy, hanging from the os, viscid, yellow, thick, burning: *Iodum.*

Stringy, tough: *Hydrastis.*

Sticky, dark, yellow, thick, corroding labia: *Æsculus hyp.*

Sticky, smarting, corroding, swelling of the inguinal glands: *Mezereum.*

Stiffening linen yellow: *Kreosotum.*

Stool, discharge of blood at straining, uterus relaxed, engorged: *Ambra gris.*

Saffron, stains like: *Lactic acid.*

Sour-smelling leucorrhœa: *Natrum phos.*

Sweet odor, leucorrhœa: *Calc. phos., Merc. corr.*

Transparent, with relaxed vagina: *Agnus cast.*

Tenacious, yellow, copious: *Aconitum.*

White, non-corrosive: *Kali mur.*

Watery, constant, thin, offensive: *Kreosotum.*

Watery, profuse: *Silicea.*

Water, sudden gush of muddy: *Nitric a.*

Watery, excoriating leucorrhœa, patient feels cold: *Graphites.*

Watery, blood, pain in the back, old women: *Calc. ost.*

Watery, bloody, offensive: *Argentum nit.*

Watery, acrid: *Antimonium c.*

Watery blood, aggravated when sitting: *Antimonium t.*

Weakness, very pronounced with leucorrhœa aggravated, at 4 P. M.: *Calabar.*

Weight, leucorrhœa with sense of uterus: *Actea r.*

Yellow, cream-like, bland, with pain in small of the back: *Kali ferro.*

Yellowish, green, profuse: *Sepia,*

Yellow, staining, profuse: *Nux vom.*

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